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Cover photograph: Campus scene at Troy University in Troy, Alabama, site of the 83rd Annual Meeting of the Alabama Academy of Science, March 15-18, 2006.

Photographer: Dr. Roger Sauterer, Biology Department, Jacksonville State University.

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ABSTRACTS

Papers presented at the 83rd Annual Meeting
Troy University
Troy, Alabama
March 15-18, 2006

BIOLOGICAL SCIENCES

LARGE WOODY DEBRIS AND ITS INFLUENCE ON MACRO-INVERTEBRATE ASSEMBLAGES IN SOUTHEASTERN COASTAL PLAIN STREAMS, USA. Sameer Bharrarai and Michael W. Mullen, Dept. of Environmental and Biological Sciences, Troy Univ., AL 36082

Large woody debris (LWD) has important structural and functional roles in streams, but little research on the function of LWD has been performed in the southeastern coastal plains. This study surveyed LWD in 35 stream reaches in the Choctawhatchee River watershed in SE Alabama. The study reaches were a mix of urban, forested and mixed stream drainages. LWD characteristics and functions were quantified. Pool and sediment characteristics and drainage areas of each reach and used with already existing macroinvertebrate data. Statistical analyses of LWD, pool, sediment, drainage and macroinvertebrate data were used to examine the relationship among LWD characteristics and functions, pool, drainage and sediment characteristics, and biological variables. There were significant differences in LWD number and volume among the three site categories. These differences apparently resulted in a higher frequency of pools, sediment storage sites and woody debris storage areas, and more ecologically important, heterogeneous habitat in forested streams that contained higher number and volume of LWD. Large woody debris positively influenced macroinvertebrate assemblages and partially abated the negative effect of fine sediment on macroinvertebrates, as indicated by significant positive correlations among LWD, pools and biological variables and an apparent increase in the complexity of in-stream habitat.

DNA TESTING OF *E. COLI* FORMS IN SURFACE WATERS USING BOX AND REP PCR TECHNIQUES. Brian S. Burns, Dept. of Biology, Judson College, Marion, AL 36756. Stephanie M. Hood, Judson College, Marion, AL 36756.

PCR and agarose gel electrophoresis techniques were used to differentiate between human and bovine fecal point source pollution. BOX A1R (5'-CTACGGCAAGGCGACGCTGACG-3') or primers REP 1R (5'-IIICGICGICATCIGGC-3') and REP 2I (5'-ICGICTTATCIGGCCTAC-3') were used to generate DNA fragments. *Escherichia coli* isolates were obtained from cows in the lower Cahaba water shed. Human samples were obtained from Judson College students. *Escherichia coli* isolates were also obtained from Dry Creek in the lower Cahaba water shed.

MITOCHONDRIAL DNA VARIATION IN WALLEYE AND SAUGER. Neil Billington, Dept. Biol. Environ. Sci., Troy Univ., Troy, AL 36082.

Walleye (*Sander vitreus*) and sauger (*S. canadensis*) are carnivorous percid fish species that are extensively managed by fisheries agencies because they are highly valued by anglers. Information on the genetic structure of these two species will assist in management decisions. Restriction fragment length polymorphisms of whole-molecule mitochondrial DNA (mtDNA) was examined for 135 sauger from 17 populations, and more than 1000 walleye from 100 populations, spanning the natural range of both species. Little genetic variation was observed in sauger, only five haplotypes were identified and little geographic structure was seen. These data are consistent with sauger using a single (Mississippian) glacial refugium during the Pleistocene. Walleye mtDNA haplotypes can be separated into five main geographic groups, three of which can be related to post-Pleistocene recolonization events from Atlantic, Mississippian and Missourian glacial refugia. A fourth walleye group consists of a unique and genetically divergent haplotype found in the Mobile drainage. The fifth group consists of a mixture of haplotypes of glacial origin from fish recently stocked into these areas on top of a number of relic haplotypes found in the New River, VA, the Rockcastle River, KY, and the Upper Ohio River systems. Several haplotypes show localized distributions that serve as markers for stock identification. These results will prove useful for making genetic conservation decisions regarding the management of these two species.

KIDNEY STONES IN AN ATLANTIC BOTTLENOSE DOLPHIN. Gerald T. Regan, Marterra Foundation, 4000 Dauphin Street, Mobile, AL 36608-1791.

I had participated in the Alabama portion of the Southeastern United States Marine Mammal Stranding Network for 17 years, performing the necropsies of close to 400 dead-stranded specimens of the Atlantic bottlenose dolphin, *Tursiops truncatus*, without observing any kidney stones. On April 15, 2004, however, a 242 cm long freshly dead female specimen appeared on the beach on the south side of Dauphin Island in Mobile County, Alabama, that had stones. The necropsy was performed the next day on property generously made available by the Marine Resources Division of the Department of Conservation and Natural Resources. There were five corpora albicantia on the two ovaries combined, which is evidence for the age of the specimen, in the vicinity of 20 years. Using the protocol of cutting each kidney into cross-sectional slices about the thickness of a slice of sandwich bread, I was not surprised at finding a typically healthy appearance for the right kidney. A little over half way down the left kidney, the knife began to scrape on some hard objects. Further inspection showed that the objects were kidney stones apparently filling both minor and major calyces. The largest was over 3 cm long, and the rest were of ever-decreasing lengths and diameters. Daniel F. Cowan of the University of Texas Medical Branch oversaw the chemical analysis that showed the stones to be constituted of ammonium acid urate.

FLUORESCENCE STUDY OF SUNSCREENS IN HETEROGENEOUS NANOSPHERE MEDIA. Rajagopal Krishnan and Thomas Nordlund, Department of Physics, University of Alabama at Birmingham.

Sunscreens applied to skin are primarily observed to be located in a complex environment of outer epidermal layer called stratum corneum. Studying basic optical properties of sunscreens which are supposed to act like an optical filter is difficult in a realistic environment like heterogeneous epidermis. Hence, UV absorption and transmission properties of sunscreens are often studied in solvent which does not mimic the skin, or they are studied in complex artificial skin systems which are difficult to handle and expensive to perform. Studying the fluorescence emission of sunscreens in heterogeneous nanosphere environment and comparing the result with emission of sunscreens in skin cell and excised skin, we concluded that the polystyrene spheres in buffer can serve as mimic for skin, by presenting polar/apolar environment observed in living tissues. We will present the fluorescence emission results of octyl salicylate, octyl methoxy cinnamate and padimateO and our proposed method to obtain their approximate protection factor by using the fluorescence spectroscopy and polystyrene nanospheres. Acknowledgements: Supported in part by a grants from NCI (CA94327), NIH grants R01 CA86172 (CAE), P30 AR050948 (UAB Skin Diseases Research Center) and from VA grant 18-103-02 (CAE) and from the University of Alabama at Birmingham (Preparing Future Faculty award and GAPF graduate fellowship, support of R. K.).

RUDBECKIA AURICULATA (PERDUE) KRAL PARASITIZED BY *ASPHONDYLIA RUDBECKIAECONSPICUA* OSTEN SACKEN (DIPTERA: CECIDOMYIIDAE) IN ALABAMA. Alvin Diamond, Dept. of Biological and Environmental Sciences, Troy University, AL 36082

Rudbeckia auriculata (Perdue) Kral is a rare wetland associated species endemic to the southeastern United States. This is the first report of parasitism by *Asphondylia rudbeckiaeconspicua* Osten Sacken (Diptera:Cecidomyiidae) on *R. auriculata* in Alabama. No information regarding parasites has previously been reported for this species in the literature or in status surveys for the U. S. Fish and Wildlife Service. Infected populations contained over one thousand flowering stems and the parasite has not been observed at smaller populations.

EFFECTS OF SYMBIOTIC SOIL MICROORGANISMS OF DIFFERENT ECOTONES IN THE INVASION OF KUDZU IN SOUTH ALABAMA. Patricia Kinney and Dr. S. Greipsson, Dept. Biol. and Env. Sci., Troy Univ. Troy, AL 36082. Dr. H. El-Mayas, Dept. Biol. Georgia State Univ. Atlanta, GA 30302.

Invasion of exotic plants is a great threat to biodiversity and ecosystem function. Kudzu [*Pueraria montana* (Lour.) Merr.] is a notoriously invasive, exotic legume that is commonly found in South Alabama. Kudzu damages ecosystems by smothering native vegetation as it limits the space, water, sunlight, and nutrients available to native plants. We investigated the possible role of the symbiotic soil microorganisms *rhizobia* and arbuscular mycorrhizal fungi (AMF) in the invasion process. Soil samples were collected from four ecotones in Pike County, Alabama: (1) where native plant species are abundant, (2) where *P. montana* dominates, (3) at the forest edge, and (4) from stockpiled soil. Kudzu seeds were germinated on sterilized 0.75% water agar, and seedlings were placed in pots (n=3). Plants were harvested after eight weeks, and growth attributes were measured. Roots were examined for nodules, and *rhizobia* was extracted and analyzed by REP-PCR. Roots were stained, and AMF root colonization was estimated. Kudzu plants grown in soil collected from native plants had significantly highest numbers of root nodules, leaf numbers, plant length, biomass, and dry mass than those of plants in other treatments. The results suggest that native symbiotic soil microorganisms facilitate the invasion of kudzu.

USE OF PRINCIPAL COMPONENTS ANALYSIS TO DESCRIBE WATER QUALITY IN THIRTEEN STREAMS IN CENTRAL AND WEST-CENTRAL ALABAMA. Rosine W. Hall and John M. Aho, Auburn University Montgomery, Montgomery, AL 36124.

The Alabama Department of Environmental Management (ADEM) received a grant from the U.S. Environmental Protection Agency (EPA) to conduct a study of nutrient loading to Alabama reservoirs, and contracted with Auburn University Montgomery (AUM) to conduct a part of the study. This document presents the results of the AUM study of thirteen streams in central Alabama. Sampling occurred between December 8, 1998 and December 22, 1999. A total of 300 water samples were collected. Measured parameters include: water temperature, pH, specific conductivity, dissolved oxygen, turbidity, total Kjeldahl nitrogen, total ammonia nitrogen, total nitrate and nitrite nitrogen, total phosphorus, total suspended solids, and total dissolved solids.

Using a multivariate statistical technique called principal components analysis, we were able to rank the watersheds based on their relative overall water quality. In general, urbanized watersheds had lower water quality, but a few largely rural watersheds had much worse water quality relative to all sites we sampled than we would have expected.

ROTIFER DIVERSITY IN PONDS AND LAKES AT TROY UNIVERSITY. Eric S. Harris and Stephen C. Landers. Department of Biological and Environmental Sciences, Troy University, Troy, AL 36082.

Numerous ponds and lakes are located on the Troy University campus, which provide an excellent resource for teaching and research materials. For the past two years a survey of aquatic life has been conducted to catalog the protists and microscopic metazoans found in these freshwater bodies. This report will focus on the rotifers (Phylum Rotifera). Collections were made using a 20 μm plankton net, which was cast from a dock or the shoreline and pulled below the surface. Organisms were immediately examined and were sketched, measured, and photographed when possible. Eleven different genera of rotifers have been identified. Of these, *Keratella* and *Philodina* were the most abundant, while the least abundant were *Collotheca* and *Conochiloides*. This project was supported by a Troy University Chancellor's Fellowship awarded to ESH.

SEASONAL VARIATIONS OF REPRODUCTIVE FUNCTIONS IN MALE MOSQUITOFISH, *GAMBUSIA AFFINIS*. Paul D. Melvin, III and Robert A. Angus, Dept. of Biology, Univ. of Ala. at Birmingham, Birmingham, AL, 35294.

The mosquitofish, *Gambusia affinis*, is a useful biomonitor for endocrine disrupting compounds (EDCs) because of its widespread presence around the world, large environmental tolerances, and ease of use in the laboratory. Previous studies have shown that vitellogenin production in males and modified anal fin development (masculinization) in females are reliable indicators of endocrine disruption. I hypothesize that sperm production in male *G. affinis* will also be a reliable indicator of EDCs and have shown in previous work that *G. affinis* living below a Waste Water Treatment Plant (WWTP) outfall have decreased mobilized sperm production. In order to further evaluate this hypothesis, it is important to understand any factors that cause natural fluctuations in sperm counts. This current study demonstrates the seasonal variability in mobilized sperm production in a population of *G. affinis* not exposed to endocrine disruptors. Male *G. affinis* were collected once per month for one year from a local, spring fed pond and brought back to the laboratory where sperm was collected and counted. Sperm production was fairly constant throughout the year (mean = $9.86 \times 10^6 \pm 1.64 \times 10^6$ SE) per ejaculate, with the exception of July, which had a significantly higher mean sperm count ($2.15 \times 10^7 \pm 1.87 \times 10^6$, $p < 0.001$) than other months. Mean sperm counts for males from the nonpolluted spring sites were always significantly higher than from males collected at the site below the WWTP. These data contribute to the usefulness of sperm production by *G. affinis* as a biomarker of exposure to estrogenic EDCs.

DETERMINATION OF THE INCIDENCE OF CERVICAL DYSPLASIA IN AN HONDURAN USING TWO DIFFERENT TECHNIQUES. Thomas F. Garth, Dept. of Biology, BSC, Birmingham, AL 35254. George B. Inge, Dept. of Obstetrics and Gynecology, UAB, Birmingham, AL., Jeannette Runquist, Dept of Biol. BSC, Birmingham, AL 35254, and Luis Zuniga, San Pedro Sula, Honduras.

Under the direction of George B. Inge, the introduction of ThinPrep technology in San Pedro Sula, Honduras has provided the Our Little Roses home and indigent patients with a more effective cervical screening method. Numerous past studies indicate that Thinprep technology is both more sensitive and more accurate than conventional Pap smears in detecting dysplastic, pre-carcinomic, and carcinomic conditions, and therefore was accepted as the gold standard for this study. In order to measure the impact of Thinprep technology in a novel setting, results of both conventional Pap smears and Thinprep technology were recorded and analyzed along with the patient's relevant history. The data show that approximately 19.2 percent of patients (n=99) had incongruent results; therefore, indicating the presence of a false positive or a false negative result.

STRUCTURE AND FUNCTION OF FISH ASSEMBLAGES IN BEAVER PONDS OF THE CHOCTAWHATCHEE-PEA AND CONECUH RIVER WATERSHEDS, ALABAMA. Amanda F. McCall, Jimmy L. Aplin, Wes A. Robertson, and Paul M. Stewart, Department of Biological & Environmental Sciences, Troy University, Troy, AL 36082.

Beaver dams affect North American streams, altering ecosystem processes and influencing aquatic biota. Yet, little is known about fish assemblages in beaver ponds of the coastal plains of Alabama and their affects on stream fish assemblages. Twenty-five beaver ponds in the Choctawhatchee-Pea and Conecuh River watersheds of Alabama were examined. Ponds were sampled using both a Smith Root ® Model 12-B backpack electrofisher and a seine. Water chemistry, area (ha), maximum depth (m), and mean depth (m) were obtained at each site. Biological indices were used to examine fish assemblage structure and function. One thousand two hundred sixty-five individuals and 29 species were collected. *Lepomis macrochirus*, *Gambusia holbrooki*, and *Labidesthes sicculus* were most common in beaver ponds and *Ericymba buccata*, *Cyprinella venusta*, and *Lepomis megalotis* were most common in streams. Number of species, percent tolerant individuals, number of intolerant individuals, number of darter and madtom species, and percent individuals as lithophilic species differed significantly from the same metrics observed in fish assemblages from stream environments in this region. This study suggests that beaver dams biologically alter stream fish assemblages, changing them both structurally and functionally.

PROTEIN ELECTROPHORETIC DISTRIBUTION OF GENETIC VARIATION IN SAUGER POPULATIONS. Amy Barr and Neil Billington, Dept. Biol. Environ. Sci., Troy Univ., Troy, AL 36082.

Sauger (*Sander canadensis*) is a carnivorous percid species of fish that are common in the mid-western U.S. and the Great Plains region. Little work has been conducted on genetic variation in sauger compared to the congeneric walleye (*S. vitreus*), which tends to be more popular with anglers. Genetic variation was screened by cellulose acetate electrophoresis for 991 saugers in 11 populations from the mid-west (South Dakota and Iowa) and the Great Plains (Saskatchewan and Alberta, Canada, Montana, and Wyoming). Two loci of 35 screened were polymorphic in sauger: super oxide dismutase (*SOD-2**) and esterase (*EST**). Genetic variation at *SOD-2** was only detected in the Missouri River drainage populations. Highly significant among population heterogeneity was found at both *EST** and *SOD-2*. Most populations in Montana and Wyoming showed significant deviations from Hardy-Weinberg expectations, all due to heterozygote deficits, likely caused by genetic drift or inbreeding related to small population sizes in these two states. Management agencies should try to maintain population sizes in Montana and Wyoming by reducing bag limits and encouraging catch and release of sauger.

VARIATIONS OF LIFE HISTORY AMONG BURROWING CRAYFISH IN THE *CAMBARUS DIOGENES* (GIRARD) COMPLEX. Jonathan M. Miller and Paul M. Stewart, Dept. of Biol. & Environ. Sci., Troy University, Troy, AL, 36081.

Limited information exists on crayfish (Decapoda: Cambaridae) in the southeastern United States. Information on primary burrowing crayfish is even more uncommon, as they are extremely difficult to collect. Morphological differences show at least two variations among the *Cambarus diogenes* (Girard) complex. The objective of this study was to determine and compare the life histories of two species (*C. diogenes* and *Tubericambarus* sp.) in the complex over a one-year period. Approximately ten crayfish were excavated monthly at three designated locations within the upper Choctawhatchee River (AL) watershed. Unfortunately, April, August, and September were not sampled. Specimens collected were identified and sex was noted along with the reproductive form of the male. We found a total of 142 crayfish of both species during the study. Sex ratios were in favor of the females for both species (*C. diogenes* 1.7:1; *Tubericambarus* sp. 1.3:1). There were fewer *C. diogenes* males found during the study ($n = 12$), 58% were Form 1 and 42% were Form 2. Due to the small sample size for this species, the appearance of Form 1 males were sporadic. More *Tubericambarus* sp. males were found ($n = 48$), of these 31% were Form 1. Form 1 males of this species were found from November through March, and two were found during July. Females of both species were found throughout the study ($n = 82$), but only one ovigerous *Tubericambarus* sp. was found during February.

UPDATE ON THE BACTERIOLOGICAL CONTENT OF DRY CREEK. Lydia Dews Glasscock and Dr. Brian S. Burnes, Biology Dept., Judson College, Marion, AL 36756

The distribution of resistance to ampicillin, chloramphenicol, erythromycin, neomycin, oxytetracycline, spectinomycin, vancomycin, tetracycline, and streptomycin among fecal coliforms was investigated as part of a continuation of an observation of the bacteriological content of Dry Creek in Perry County. Two years ago, this creek was shown to have a large amount of certain bacteria, including *E. coli*. The origins of these bacteria were then traced and found in some instances to be human in origin. Since this survey, a nearby trailer, thought possibly to be the point source of pollution responsible, has installed a septic tank. This followup has taken multiple samples of the creek, both during a dry spell and immediately after rain, attempted to culture fecal coliforms from the samples, and then checked for antibiotic resistant strains of the fecal coliforms cultured using these different antibiotics. All samples taken show considerable antibiotic resistance to all antibiotics save neomycin and streptomycin. Antibiotic resistance was also greater against ampicillin, oxytetracycline, and tetracycline after a period of rain than after a dry period. A human point source of pollution is still highly indicated by the levels of antibiotic resistant strains of fecal coliforms present in the waters of Dry Creek.

HYBRIDIZATION AND INTROGRESSION BETWEEN SAUGER AND WALLEYE DETERMINED BY PROTEIN ELECTROPHORESIS. Janet Gaston, Rachael N. Koigi, Ronald E. Creech, P. Taylor Ezell, and Neil. Billington, Dept. Biol. Environ. Sci., Troy Univ., Troy, AL 36082.

Sauger (*Sander canadensis*) and walleye (*S. vitreus*) are large predatory percid fishes that are highly prized by anglers. They are known to hybridize and these hybrids then backcross with the parental species leading to introgression, the movement of genes of one species into another. Several studies have shown that morphological examination is unreliable for identifying hybrid and introgressed fish compared to protein electrophoresis. Cellulose acetate gel electrophoresis was used to examine >2000 fish collected from Iowa (one population), Montana (15 populations), South Dakota (three populations), Wyoming (two populations), and Saskatchewan, Canada (one population) to document hybridization and introgression between sauger and walleye. No hybridization was detected in Wyoming. In Pool 13 of the Mississippi River, Iowa, 25% of individuals were hybrid or introgressed. In Montana, between 0-22% of sauger from the Missouri River drainage and 0-10% from the Yellowstone River drainage were hybrids or backcrosses. In South Dakota, 4.2% of fish were hybrids or introgressed in Lake Sharpe, 3.9% in Lake Francis Case, and 21.2% in Lewis and Clark Lake. In Lake Diefenbaker, Saskatchewan, 20.9% of fish were hybrid or introgressed. In all cases hybrid numbers were underestimated by morphological examination. Protein electrophoresis was much more reliable than morphological examination for separating sauger, walleye, and their hybrids.

NORTHERN BLOT ANALYSIS OF DIFFERENTIALLY INDUCED TRANSCRIPTION TERMINATION REPORTER GENES. Yoon Cho, Dan Bai, and Christi Magrath, Department of Biological and Environmental Science, Troy University, Troy, AL 36082.

As demonstrated in previous enzymatic studies of transcription termination in *Saccharomyces cerevisiae*, levels of transcription termination from a galactose-inducible reporter construct correlate with the level of galactose present in the growth media. The reporter construct used in the termination assays contains a galactose promoter upstream of an intron-imbedded DNA sequence insertion site that is upstream from the gene for β -galactosidase (*LacZ*). When termination occurs, the *LacZ* gene is not expressed and the RNA produced terminates with the inserted DNA sequence. Conversely, if termination does not occur, the *LacZ* gene is expressed and the inserted DNA sequence is removed from RNA by splicing. Previous enzyme assays established that the level of β -galactosidase activity directly correlated to galactose levels; however, to demonstrate the direct molecular nature of this observation, yeast cells containing the reporter construct were grown in media with varying galactose concentrations. Total RNA was obtained, and the quality and concentrations were assessed using gel electrophoresis and spectrophotometry. Northern analysis can be used to directly assess the level of terminated versus non-terminated RNA within the differentially induced samples and to corroborate the use of using varying galactose concentrations as a method of directly altering termination levels.

GENETIC VARIATION IN MONTANA SAUGER AND HYBRIDIZATION WITH WALLEYE. Rachael N. Koigi, Jingyuan Xiong, Neil Billington, Dept. Biol. Environ. Sci., Troy Univ., Troy, AL 36082 and William. Gardner, Mont. Dept. Fish, Wildlife, & Parks, Lewistown, MT 59457.

Sauger (*Sander canadensis*) populations have been declining in Montana. Factors blamed for this decline include over fishing, diversion dams, habitat degradation, and hybridization with introduced walleye (*S. vitreus*). Sauger were collected from 14 Montana populations, plus two populations from adjacent Wyoming, and one population from the Milk River, Alberta, Canada, that flows into Montana. Hybridization and introgression between sauger and walleye, and genetic variation in sauger were studied by cellulose acetate gel protein electrophoresis at four diagnostic loci. Hybridization rates were higher in the Missouri River (0-22%) than in the Yellowstone River populations (0-10%). Polymorphism was found at two (*SOD** and *EST**) of the 35 loci screened. Significant heterogeneity in allelic frequencies was documented in Yellowstone River and Missouri River populations at both loci. Several sauger populations showed significant deviations from Hardy-Weinberg expectations, all due to heterozygote deficits, likely caused by inbreeding or genetic drift. Montana sauger showed moderate population subdivision. Managers should try to minimize further reductions in population size by reducing bag limits and encouraging catch and release of sauger. Hybridization with walleye poses a serious threat to the genetic integrity of Montana sauger. Suggested management options include increasing bag limits for walleye where the two species co-occur.

UNDERSTANDING MOLECULAR CLONING AND THE STUDY OF GFAP EXPRESSION WITHIN ASTROCYTES. David V. Yokum, J. Runquist, Birmingham-Southern College, Birmingham, AL 35254, M. Brenner, J. Morello, and Y. Lee, Dept. of Neurobiology, Univ. of Ala., Birmingham, AL 35233.

Astrocytes are the most abundant cell type within the human central nervous system (CNS), and are potentially responsible for numerous developmental and regulatory functions within both normal and diseased states. In particular, astrocytes undergo reactive gliosis during CNS injuries in which they become enlarged and elevate levels of a variety of substances such as glial fibrillary acidic protein (GFAP). Although many of the consequences of reactive gliosis are likely to be beneficial, others have potential deleterious effects, and thus the ability to control GFAP expression could provide profound clinical utility. Therefore, this project seeks to understand the transcriptional regulation of the *hgfa* gene which encodes GFAP utilizing a reverse genetics approach. Essentially, the function of a specific *hgfa* DNA region is destroyed to determine whether its transcription is critical for controlling the astrocyte specificity and upregulation of GFAP in response to CNS injury. The development and isolation of such a mutated construct requires a series of molecular cloning techniques, and will be the focus of this presentation.

CARLSON'S TROPHIC STATE INDEX AS APPLIED TO SOUTHEASTERN ALABAMA FISH PONDS. P. Taylor Ezell and N. Billington. Dept. Biol. Environ. Sci., Troy Univ., Troy, AL 36082.

Carlson developed a Trophic State Index (TSI) in 1977 based on Secchi disk depth as a practical tool for measuring the algal productivity in water bodies, where values range from 0-100, each 10 unit increase represents a doubling in algal biomass. The index also has equations for converting chlorophyll *a*, total nitrogen and total phosphorus to TSI. Carlson's index was developed in Wisconsin, but has been applied to water bodies in other parts of the U.S. However, little work with TSI has been conducted in the southeastern U.S., where the majority of the water bodies are warm, monomictic fish ponds. Many of these man-made ponds are fertilized with nutrients, especially phosphorus to enhance fish productivity. We surveyed 30 water bodies (28 fish ponds and two reservoirs) in southeastern Alabama. At each water body, Secchi disk depth and a sub-surface water sample were collected during spring and fall overturn. Chlorophyll *a* and nutrient (nitrogen and phosphorus) concentrations were determined. Vertical profiles of conductivity, dissolved oxygen, light intensity and temperature were also recorded. Total alkalinity, hardness, pH, turbidity, and total dissolved solids were recorded also. The TSI values obtained from Secchi disk depth data were compared with those calculated from chlorophyll *a* and nutrient data. Values of TSI ranged from 48-93 and chlorophyll *a* concentrations ranged from 1.54-181.10 µg/L. These southeastern Alabama water bodies ranged in productivity from oligotrophic to hypereutrophic.

ETHOXYRESORUFIN-*O*-DEETHYLASE (EROD) ACTIVITY IN CHANNEL CATFISH (*ICTALURUS PUNCTATUS*) EXPOSED TO TROY (ALABAMA) WASTEWATER TREATMENT PLANT EFFLUENT. Alicia Whatley, Smriti Subedi Bhattarai, Paul M. Stewart, Christi Magrath, and Philip Reynolds, Dept. Biol. & Environ. Sci., Troy University, Troy, AL 36082.

The effect on induction of cytochrome P450 enzymes, which are involved in the first stage of xenobiotic transformation, was examined following exposure of channel catfish (*Ictalurus punctatus*) to Troy (Alabama) Wastewater Treatment Facility effluent on Walnut Creek. After one day of exposure, results showed that peak induction levels, measured as ethoxyresorufin-*O*-deethylase (EROD) activity, were 3-fold higher in channel catfish exposed to wastewater from the mixing zone on Walnut Creek, compared to fish exposed to the water from upstream on Walnut Creek. Water from Big Creek (Barbour County, Alabama) was used as a reference unpolluted site (based on a higher Invertebrate Community Index obtained from a previous assessment) for administration of PCBs, which are a known inducer of cytochrome P450 enzymes. While there was no significant increase in EROD activity in Big Creek PCB treated over Big Creek control, EROD activity in Big Creek control was 2.7-fold higher than Walnut Creek control. Although previous assessments have focused on either water quality or lethal effects on organisms, sublethal effects, such as EROD activity, might be a more sensitive indicator of the effects of wastewater and other contaminants on aquatic organisms. More water bodies in the area, even those thought to be of good quality with no apparent contaminant source, should be examined for contaminant-related cytochrome P-450 activity.

GOPHER TORTOISE (*GOPHERUS POLYPHEMUS*) POPULATIONS ON STATE LANDS IN MOBILE AND BALDWIN COUNTIES, ALABAMA. Lindsey A. Timmerman, David H. Nelson, and Joel A. Borden. Dept. of Biology, University of South Alabama, Mobile AL 36688.

Once having a geographic distribution that extended from South Carolina to Louisiana, the gopher tortoise (*Gopherus polyphemus*) now is found mostly in small, fragmented, isolated populations. Gopher tortoises have been studied extensively in some portions of their historic range, such as Florida, where they are relatively abundant. Other areas of the Southeast, however, have been largely neglected. Very few studies have been conducted in southern Alabama for the past fifty years. In an effort to fill this information gap, two gopher tortoise populations were studied in Alabama (Jacinto Port, Mobile Co. and the Northeastern sector of the Mobile-Tensaw Wildlife Delta Management Area, Baldwin Co.). We sought to assess how elevation, soil type, and vegetation might influence major population parameters: population density, age structure, reproductive success, and mobility. The trapping program yielded a total of 92 separate captures for the entire trapping season. Thirty-five individual tortoises were captured at the Northeastern Management Area: 29 males, 4 females, and 2 juveniles. Twenty-two individual tortoises were captured at Jacinto Port: 12 males, 9 females, and 1 juvenile. In Jacinto Port, the male to female ratio was 1.3 males for each female, and in the Northeastern Management Area the male to female ratio was 7.2 males for each female. During the study, we also tested both populations for Upper Respiratory Tract Disease. Twenty-eight distinct blood samples were collected over the course of the trapping season, and all results were negative.

NEW AND INTERESTING PLANTS FROM ALABAMA. Michael Woods and Alvin R. Diamond, Department of Biological and Environmental Sciences, Troy University, Troy, AL 36082.

Eleven species are reported as new to the flora of Alabama. Additionally, six significant new county records are reported for five other taxa. Of the 16 total taxa reported, four are seedless vascular plants, eight are eudicots and four are monocots. Of the eight taxa non-native to the United States, three, *Begonia cucullata* Willd., *Marsilea minuta* L., and *Pistia stratiotes* L. have invasive potential.

Distribution and Abundance of the Mississippi Diamondback Terrapin (*Malaclemys terrapin pileata*) Along Coastal Mobile County, Alabama. David H. Nelson and Joel A. Borden, Biological Sciences, University of South Alabama. Mobile, AL 36688.

Diamondback terrapins were sampled from April to August 2004 and from May to August 2005, along the southwestern coast of Alabama (Mobile County) from Bayou Heron to Cedar Point. Several trapping techniques were utilized: pitfall traps, modified crab traps, hoop traps, box traps, and nest depredation surveys. Terrapins were individually marked (notching marginal scutes), weighed, and measured (carapace length, carapace width, shell height, plastron length, tail length, and head width). Females were palpated for eggs; anomalies were noted (predation marks, prop scars, barnacle and oyster fouling), and all individuals were digitally photographed. Our goal was to systematically document the abundance and distribution of terrapins in Alabama coastal waters. Twenty-eight adults were captured (19 females, 8 males, 1 juvenile) over the two sampling seasons. Eight hatchlings were also encountered, although two were found dead. Terrapin populations appear to be sparse and isolated along coastal Alabama. The terrapin is currently listed as a "Priority One" (highest conservation concern) by the Alabama Department of Conservation and Natural Resources. Further research is needed to identify current threats to terrapin populations in Alabama and to provide for the conservation of the species in its natural habitat.

ANTIMICROBIAL ACTIVITY OF ANTARCTIC MARINE SPONGE EXTRACTS. Kevin J. Peters, Charles D. Amsler, James B. McClintock, Dept. of Biology, UAB, Birmingham, AL 35294-1170. Bill J. Baker, Dept. of Chemistry, USF, Tampa, FL 33620.

Sponges often have a great number of bacteria and other microorganisms associated within the (up to 40% of the biomass). Previous studies have documented symbiotic relationships between sponges and their associated microorganisms with some providing nutrition, protection against UV radiation, and/or secondary metabolite production. Conversely, some microorganisms may be pathogenic to sponges, or may be species-specific in their beneficial roles. Many sponges are known to be chemically defended against large predators (e.g. echinoderms and fish) and sponges may also be defended against sympatric, non-beneficial microorganisms. This study will identify the in vitro bioactivity of crude polar and non-polar extracts of antarctic marine sponges against a suite of sympatric bacteria. The bacteria were isolated from the tissues of several different antarctic marine organisms and associated water. In this ongoing study, bioactivity is measured by the ability of the extracts to prevent microbial growth on marine agar plates.

A Comparison of Herpetofaunal Communities Between Two Upland Mosaic Habitats Bordering the Mobile-Tensaw Delta. Joel A. Borden and David H. Nelson, Biological Sciences, University of South Alabama, Mobile, AL 36688.

A herpetofaunal field inventory was conducted to assess how habitat variation influences species diversity, abundance, and distribution in upland coastal plain ecosystems. The study sites were two diverse, upland areas bordering the Mobile-Tensaw Delta in southwestern Alabama. Sampling continued from February to December 2005. The objectives were to examine community structures of amphibians and reptiles (with respect to habitat type) on state-owned lands in Baldwin and Mobile Counties, Alabama. Ten representative habitat types were selected, based on elevation, dominant vegetation, age of stand, ground cover, percent canopy cover, soil type, and hydrology. The Baldwin County site is dominated by a 20-year old, former loblolly pine plantation with elevations ranging from 7-30 meters. The Mobile County site is characterized by oak flatwoods interspersed with long-leaf pines between 60 and 80 years old, at an elevation of 3 meters. Each site was sampled by a single drift fence array (composed of three arms) with six terrestrial funnels and three 19-liter pitfalls. Also included in each array were twelve cryptozoan covers, five PVC tubes (treefrog refugia), visual transects, anuran call monitoring, and hand captures. Twenty-one species of amphibians (N=2447) and thirty-one species of reptiles (N=916) were encountered. Our results confirm that different habitat types profoundly affect specific herpetofaunal assemblages. Proper management and the designation of adjacent refuge habitats surrounding a monoculture stand may mitigate the loss of herpetofaunal diversity.

INNER WORKINGS OF *EQUUS CABALLUS*: THE EFFECTS OF COMMON-USAGE MEDICATIONS ON THE NATURAL FLORA OF THE EQUINE GASTROINTESTINAL TRACT. Dr. Brian Burnes, Dept. of Biological Sciences, Judson College, Marion, AL 36756, Christy R. Spearman and Dr. Brian Burnes, Judson College, Marion, AL 36756

The natural bacteria within the equine intestinal tract are often overlooked during use of certain medications in consideration of the positive effects. The purpose of this experiment is to demonstrate the effects of three common-usage equine medications on *Escherichia coli*, *Lactobacillus acidophilus*, and *Bacillus cereus*. These three bacteria are just a few of the most common bacteria found in the gastrointestinal tract, therefore being the most logical with which to work. Separated in three agar dishes, each bacteria is exposed to a realistic dilution of each medication. Results demonstrate the effect each medication has on the different bacteria, providing a rational idea of the possible damage within the equine intestinal tract.

DNA SEQUENCE ANALYSIS OF A PUTATIVE CYTOCHROME P450 FROM WASTEWATER TREATED CHANNEL CATFISH. Robert McHugh, Smriti Bhattarai, Christi Magrath and Alicia Whatley, Department of Biological and Environmental Science, Troy University, Troy, AL 36082.

In the channel catfish, activation and expression of cytochrome p450 is evident within three days of exposure to wastewater treatment effluent. Maximal levels of p450 expression occur after six days then slowly return to basal levels. In previous analysis, both RT-PCR and EROD activity were used as markers of activity within the liver. RT-PCR of liver RNA using primers complementary to known p450 sequences from fish species generated DNA products of the expected size as determined by gel electrophoresis; however, DNA banding patterns indicated the presence of two unexpected DNA products. Consequently, the putative p450 DNA band, as well as the two unidentified DNA products, were purified from 1.5% agarose for use in DNA sequencing. The RT-PCR product's identities can be confirmed by comparative DNA analysis.

TRANSCRIPTION TERMINATION CAPACITY OF INTERGENIC REGIONS FROM *S. CEREVISIAE*. Pranjal Nahar, Kevin Flinn, James Noble, and Christi Magrath, Department of Biological and Environmental Science, Troy University, Troy, AL 36082.

Chromosome III of *Saccharomyces cerevisiae* contains twenty Autonomous Replication Sequences (ARSs). The ARS elements are localized to primarily intergenic regions and the most replicatively active ARSs are found less than 200 base pairs from the 3'-end of a gene. It is hypothesized that the ARS localization is due to the protective nature of the transcription termination sequences found at the 3'-end of the genes; thus, the transcription termination sequences act as "molecular shields" to protect the ARSs. To evaluate this hypothesis a screen of the intergenic regions harboring the ARS elements is in progress. As part of this screen, a set of oligonucleotide primers with specificity to the termini of the intergenic regions was designed. These primers can be used to amplify the intergenic regions and to generate reporter constructs that can be used to assess transcription termination capacity with enzymatic assays, ultimately allowing correlation between replication and transcription termination capacity. This study advances the understanding of the function of transcription termination elements and will be one of the first transcription termination profiles.

COMMELINA ERECTA—ITS FLOWER STRUCTURE, REPRODUCTIVE BIOLOGY, AND ITS INTERACTIONS WITH HERBIVORES. Roland Dute and Debbie Folkerts, Dept. of Biological Sciences, Auburn University, AL 36849.

Commelina erecta (erect dayflower) is a species native to much of the eastern and southern U.S. It flowers from mid-June through early September in East Central Alabama. The inflorescence develops within a spathe or modified leaf. Flowers emerge one at a time from the spathe every other day to every fourth day. An individual flower is open for only a matter of hours. The petals then deliquesce and the pedicel curves such that the developing fruit is pulled back into the spathe where fruit development continues. The spathe contains a mucilage whose complete chemical composition is unknown but includes the elements silicon, calcium, chlorine, and potassium. A common predator of *C. erecta* is the beetle *Neolema sexpunctata* whose larvae feed on the underside of the leaves. The larvae tend to avoid the outer surface of the spathe probably due to the high concentration of siliceous hook-shape trichomes found there. Grasshoppers also are a major predator of leaves and spathes. Counts of flower stalks pre- and post-anthesis show a considerable loss of reproductive potential via flower abscission. The proximal abscission scars show features identical to similar scars found in dicotyledonous plants. Insect visitors such as syrphid flies (*Toxomerus bosci*) and bumblebees (*Bombus* spp.) are common visitors and carry pollen grains of *C. erecta* on their bodies. Although *C. erecta* can self-pollinate, insect visitors provide cross pollination.

PIT MEMBRANE STRUCTURE IN THE WOOD OF TWO SPECIES OF GYMNOSPERMS. LaToya Hagler, Adam Black, and Roland Dute, Dept. of Biological Sciences, Auburn University, AL 36849.

Pit membranes provide a pathway for the flow of water between tracheids in the xylem of vascular plants. The torus, a central thickening of the pit membrane (as distinct from the thin margo), interacts with the pit apertures to provide a safety mechanism that impedes the movement of air embolisms throughout the vascular system. This study is designed to compare the structure and development of pit membranes in two species of cone-bearing gymnosperms, *Metasequoia glyptostroboides* and *Abies firma*. Branch segments were preserved and processed for microscopy by traditional methods. Thin sections of xylem were stained and viewed both by light and electron microscopy. In both species, the torus thickening is initiated at an early stage in the ontogeny of the pit membrane. Pit membranes of *Abies* are traversed by secondary plasmodesmata. Thus far, no such structures have been located in *Metasequoia*. As the tracheid cytoplasm undergoes autolysis, the matrix materials in pit membranes of *Metasequoia* are removed from both torus and margo regions. However, in *Abies* only the margo loses its matrix material, whereas the torus remains intact. It is apparent from the photographs that the torus in mature, water-conducting tracheids of *Abies* is a more substantial structure than the torus of *Metasequoia*. Whether this difference in final structure leads to a difference in protection from the spread of air embolisms is unknown. Work is continuing on these species in an effort to correlate the differences in pit membrane ontogeny with cytoplasmic differences during development.

HABITAT USE BY PLETHODONTID SALAMANDERS IN NORTHEAST ALABAMA. Clifford J. Webb and Dr. George Cline, Dept. of Biology, Jacksonville State Univ., Jacksonville, AL 36265.

Plethodontid salamanders form complex communities in small streams. This fifteen-month study examines physiological/morphological trends, habitat usage, seasonal activities and reproductive phenology of seven Plethodontid salamanders. The following salamanders were collected: *Eurycea cirrigera*, *Eurycea guttolineata*, *Desmognathus conanti*, *Plethodon glutinosus*, *Plethodon serratus*, *Gyrinophilus porphyriticus* and *Pseudotriton ruber*. The study site is in the North-East corner of Alabama, in Talladega county (33° 32'57.4"N, 85°49'23.7"W) in Talladega National Forest. Three reaches in a seasonally intermittent stream were studied. Each reach contained three different hydro geomorphic units with one repeat per reach. Three open-ended PVC pipe traps and leaf-litter bags were placed in each of the geomorphic units at each site. *Eurycea cirrigera* was by far the most abundant salamander collected with all developmental stages observed. Adult *Eurycea guttolineata* were encountered infrequently, but they were always found on stream margins. *Desmognathus conanti* were second in abundance to *E.cirrigera*. *Plethodon glutinosus* were always found in the riparian zone under debris or in leaf litter bags. *Plethodon serratus* only appeared in cold, wet winter months and always under debris away from the stream. *Gyrinophilus porphyriticus* were always found in the stream and only as larvae. *Pseudotriton ruber* appeared in very low numbers and only terrestrial adults were found usually under rotted logs. *E.cirrigera* and *D.conanti* were in highest abundance in riffle areas. Larval *E.cirrigera*, *D.conanti* and *G.porphyrificus* were identified from the stream. All larvae collected were also in highest abundance in riffle areas.

BENTHIC FEEDING BEHAVIOR IN THE COASTAL LOBATE CTENOPHORE *MNEMIOPSIS MCCRADYI*. J. Christopher Taylor, Deborah C. Odom, and Anthony G. Moss, Biological Sciences, Auburn University, 36849.

Mnemiopsis mccradyi is a common coastal plankter in the Gulf of Mexico. We describe here observations that indicate that *Mnemiopsis* does not limit its feeding to the water column. We routinely collect ctenophores with sediment in their stomodea and with benthic materials (such as benthic diatoms) in their food grooves. In lab, we observe *M. mccradyi* to interact with the flocculent layer of sediment using 8 distinct behavioral modes. Video recordings show *Mnemiopsis* moving sediment via precise lobular contractions combined with auricular groove currents generated by auricular comb plates. Particles captured from the spiral auricular current are passed directly to the food groove. Soluble fluorescein was used to track current flow through the interlobular volume and the auricular grooves in animals resting with the tips of their lobes on the flocculant upper sediment. As *Mnemiopsis* pushes against the sediment, auricular currents draw water to and around the animal and through the interlobular spaces. This study reveals a heretofore-unrecognized mechanism for carbon transfer into the water column, and could provide a mechanism for the acquisition of a recently-discovered protistan parasite assemblage (Hydrobiologia 451: 295). NSF Grant # NSF-MCB-0348327 to AGM, REU to JCT.

GAMETOPHYTIC AND SPOROPHYTIC RESPONSES OF *PTERIS* SPP. TO ARSENIC. T. Justun Durham and Hollings T. Andrews, Dept. of Biology, Tenn. Tech. Univ., Cookeville, TN 38505. T. Wayne Barger, Dept. of Conservation, State Lands Division, Montgomery, AL 36130. Matthew S. Wilson, Florida Dept. of Environmental Protection, Bureau of Mine Reclamation, Tallahassee, FL 32310.

Few plant species have demonstrated the ability to hyperaccumulate heavy metals from contaminated soil. Recently, *Pteris vittata* L. has been identified as a hyperaccumulator of arsenic. Because gametophytic development is an essential stage in the fern life cycle, impacts of heavy metal hyperaccumulation on gametophytic and sporophytic tissue must be investigated if successional bioremediation efforts are to be implemented successfully. Our research showed that sporophytes as well as gametophytes of *P. vittata* are capable of As uptake and accumulation. Increased As (≤ 2500 ppm) did not inhibit spore germination, and deleterious effects on gametophyte morphology were observed only after extended time periods on media with extremely high As concentrations (≥ 600 ppm). Six other *Pteris* species varied in ability to germinate on As-containing media. Sporophytes of *P. vittata* showed no adverse effects when exposed to the highest soil As levels (1650 ppm); in fact, root proliferation was observed in areas of increased As concentration (250 ppm). Foliar application of an arsenical herbicide (calcium acid methanearsonate) to sporophytes resulted in decreased chlorophyll and carotenoid concentrations. Phosphate additions inhibited As uptake by sporophytes, indicating As uptake involves the phosphate transport system.

ECONOMIC UTILIZATION OF POTATO PEEL WASTE FOR BIOREMEDIATION OF PERCHLORATE IN WATER.

Benedict C. Okeke*, Dept. of Biology, Auburn University Montgomery, AL 36124-4023.

William T. Frankenberger Jr., Dept. of Environ. Sci., Univ. of California Riverside, CA 92521.

Perchlorate (ClO_4^-) is detected in ground water throughout the United States, because ClO_4^- was extensively used in solid propellants for rockets, missiles and explosives. ClO_4^- is recalcitrant in the environment and is potentially toxic to various forms of life. Bioremediation is an attractive strategy for ClO_4^- -contaminated water. Carbon substrates such as acetate used for microbial reduction of ClO_4^- are, however, expensive. This study thus explored the potential application of potato peel waste and starch in combination with an amylolytic bacterial consortium for ClO_4^- bioreduction in water. Potato peel waste supported ClO_4^- reduction by *Dechlorosoma* sp. perclace with the rate of ClO_4^- reduction being dependent on the amount of potato peels. ClO_4^- was rapidly degraded reaching non detectable level ($<4 \mu\text{g/L}$) in 9 days. No substantial reduction of ClO_4^- was observed in sterile potato peel medium without *Dechlorosoma* sp. perclace in 7 days. Redox potential of the potato peel cultures was favorable for ClO_4^- reduction, decreasing to as low as -294 mV in 24 h. Sugar levels remained very low in cultures effectively reducing ClO_4^- and was substantially higher in sterilized controls. Results indicate that potato peel waste in combination with amylolytic and ClO_4^- reducing bacteria can be economically used to achieve complete ClO_4^- removal from water.

EFFECTS OF ENVIRONMENTAL STRESS ON LEVELS OF CYANIDE PRODUCTION IN SELECTED PLANTS.

Anna Chandler and H. Wayne Shew, Dept. of Biology, Birmingham-Southern College, Birmingham, AL 35254.

More than 2,650 species of plants have been found to be cyanogenic or cyanide producing. Cyanogenesis in plants results from the action of plant enzymes that convert complex cyanogenic glycosides into hydrogen cyanide (Asano, 2005). Cyanogenesis functions to reduce damage to plants from attack by fungi and herbivores, and occurs when cells are damaged or stressed. In this study, we exposed the leaves of a variety of cyanogenic plants to environmental stress conditions. These conditions included salinity, drought, herbicide application, high nitrogen fertilizer application, and mimicked herbivory. We then used a quantitative, spectrophotometric method to measure the amount of cyanide produced in the leaf tissues of these plants. We found that in some species certain stress conditions led to an increase in the level of cyanogenesis.

THE EFFECT OF DIETARY CARBOHYDRATE ON WEIGHT GAIN AND GONAD PRODUCTION IN JUVENILE *LYTECHINUS VARIEGATUS*

(ECHINODERMATA). Anna L. Morris, Mickie L. Powell, and Stephen A. Watts, Dept of Biology, Univ. of Ala. at Birmingham, Birmingham, AL 35294. Addison L. Lawrence, Texas Agricultural Experiment Station, Texas A&M, Port Aransas, TX 78373.

The high demand for sea urchin gonads (roe or uni) has resulted in overfishing of many wild sea urchin populations. To supply the demand for roe, the development of a sea urchin aquaculture industry using cost-effective formulated feeds is necessary. In adult sea urchins, formulated feeds support weight gain and gonad production; however, studies demonstrating the effects of formulated feeds on juvenile growth are limited. In the first study, juvenile sea urchins as small as 3 to 4 mm test diameter consumed and utilized a semi-purified feed formulated for sea urchins. In a second eight-week study, feeds containing 31% protein (dry weight) and three levels of dietary carbohydrate: 1) low (LC, 16% dry weight); 2) medium (MC, 22% dry weight); and 3) high (HC, 36% dry weight), were fed to juvenile sea urchins reared individually at 22 C and 32 ppt synthetic seawater. Sea urchins fed the LC feed had significantly higher weight gain than individuals fed the HC feed. Weight gain of sea urchins fed the MC feed was not significantly different from LC or HC. Gonad production was minimal and did not vary with feed. These data indicate that adequate energy was available to support weight gain in all feeds; however, those individuals fed the highest protein:energy ratio had the highest weight gain. We suggest cost-effective, high quality feeds will support juvenile sea urchin growth and will be important in the developing aquaculture industry.

Keyword: *Lytechinus variegatus*

STATUS OF CANDIDATE MUSSEL SPECIES IN THE GULF COASTAL PLAINS, SE ALABAMA. Paul M. Stewart, Dept. Biol. & Environ. Sci., Troy Univ., Troy, AL 36081. Megan M. Pilarczyk, Dept. Biol., Wake Forest Univ., Winston-Salem, NC 27106.

Freshwater mussel assemblages in the southeastern United States are diverse yet imperiled. Continued status updates for this group are required for their preservation. In summer 2004, we performed a qualitative survey of freshwater mussel assemblages at 24 sites in southeastern Alabama and one site in northwest Florida. Efforts were focused on seven candidate species: *Margaritifera marrianae*, *Fusconaia escambia*, *Lampsilis australis*, *Pleurobema strodeanum*, *Ptychobranhus jonesi*, *Quincuncina burkei*, and *Villosa choctawensis*. The survey information was compared to recent historical records from the 1990s using presence-absence analysis. There was no significant difference between the number of taxa found in the 1990s and in 2004. There was a significant reduction from the 1990s to 2004 in the number of candidate species found at a site, with all candidate species except *P. jonesi* found at fewer sites. *Pleurobema strodeanum* declined at the greatest number of sites, making it a species of utmost concern. The historical data often lacked abundance and number of man hours information, thus it was difficult to make direct comparisons between the two data collection periods. Future mussel surveys should follow protocols such as those prepared by Carlson (et al.) and report the number of species, number of individuals of each species (live and dead), and number of man hours. Data collected in this study supports the need to elevate these species under Endangered Species Act protection.

ANALYSIS OF CILIARY AND FLAGELLAR ACTIVITY WITH A LASER SCATTERING MICROSCOPE. Anthony Moss and Margaret West, Biological Sciences, Auburn University, 36849

We have modified a metallurgical microscope to provide incident laser illumination of opaque ciliated epithelia to allow computer-aided analysis of ciliary beating. A Melles Griot 5 mW HeNe laser model MELU12 mounted to the side port of a Leitz Metallux ND microscope provided coherent, monochromatic laser light to the specimen via the outer illuminating tube of the Ultropak vertical illuminator and attached objectives (22X to 62X objectives worked well). Backscattered light was collected by a sensitive photodiode (model ST386-18L, Hamamatsu Corporation) mounted at the focal point of a 10X projection ocular. The output of the photodiode was sent to a differential amplifier operating at 1000-5000 gain (model 502, Tektronix) and the amplified output sent to an analog to digital converter (model 1401, Cambridge Electronic Designs). Digitized time-series data analyzed by Fast Fourier Transform revealed principal components that corresponded precisely to known frequencies applied to a reflective piezoelectric probe driven by a Hewlett-Packard sine wave generator at up to 500 Hz. The laser backscatter system reliably revealed the beating activity of an opaque ciliated epithelium removed from the Asian Clam, *Corbicula fluminea* at rates reported in the literature, namely 12 to 14 cycles per second. Surprisingly, the system was not directionally sensitive and could reveal beating at any angle of applied laser illumination. Development of this instrument allows improved, reliable and objective analysis of mucociliary transport systems with wider bandwidth than competing video-based systems. Support: USDA CSREES ALA016-033, NSF-MCB-0348327 to AGM.

SPONGE-PHOTOSYMBIONT ASSOCIATIONS IN CARIBBEAN CORAL REEFS OF PANAMA. Patrick M. Erwin and Robert W. Thacker, Dept. of Biology, Univ. of Ala., Birmingham, AL 35294-1170.

Symbioses between marine sponges and photosynthetic organisms have been described from coral reef communities; however, the frequency of these associations and the ecological nature of interactions between hosts and symbionts often remain unresolved. We determined the number and abundance of sponge species harboring photosymbionts in the shallow-water reefs of Bocas del Toro, Panama, by conducting line-intercept transects with measurements of chlorophyll *a* (chl *a*) concentration. Sponges were dominant members of these benthic communities, second in abundance only to stony corals. Twenty-five of the 67 species investigated (37.3%) exhibited high chlorophyll levels (>150 µg/g) and accounted for 35.6% of the observed sponge community. Association with photosymbionts is a common strategy among coral reef sponges and may represent an important source of primary productivity in oligotrophic coral reef environments. Additionally, two sponge species known to harbor cyanobacterial symbionts (*Aplysina fulva*, *Xestospongia subtriangularis*) were experimentally shaded to test the effects of reduced light availability on symbiont load and host growth. Six weeks of shading reduced (>40%) the abundance/activity of symbionts. In *A. fulva*, control sponges exhibited over twice the growth of shaded sponges. In *X. subtriangularis*, no significant difference in growth was observed between control and shaded sponges. These results suggest that the relationship between sponges and their cyanobacterial symbionts varies among host species, with some sponges strongly dependent on symbiont photosynthesis and others unaffected by short-term decreases in symbiont activity.

PHOTODYNAMIC DYE TREATMENT OF FISH PATHOGENS.

Mark Meade, Benjie Blair and Charles Olander, Jacksonville State University, Dept. of Biology, Jacksonville AL 36265.

Current treatments for pathogenic fish protozoa include using medicinal baths containing formalin, copper sulfate, malachite green, and/or combinations of the three. The stringency of these treatments can themselves result in fish demise. Initial medicinal bath experiments suggested that the photoactive dye phloxine b could be used to treat protozoa infestations including *Tetrahymena* and *Ichthyophthirius* without harm to the treated fish. Concentrations of 10 mg/L resulted in protozoa demise and reduced the numbers infesting fish. Recently the photoactive dye was compared with several other dye compounds, including acridine orange, rose bengal, methylene blue, eosin yellow, and malachite green. *Tetrahymena* were grown in light and dark conditions in culture media containing either 0, 1, 5, or 10 ppm of the dyes and held in an environmental chamber at temperatures of 19, 22, 26, or 30°C. Culture densities were monitored by turbidity measurements after 24 hr. In general phloxine b was more effective than the other dyes at reducing cell proliferation in the light. Malachite green, a non-photoactive dye, was the most effective treatment in the dark, however, phloxine b was as effective as malachite green in the light. Increased temperature resulted in reduced cell growth for all compounds tested. Overall, these data further demonstrate that the photodynamic activities of phloxine b may be useful in eradicating pathogenic fish protozoans.

FURTHER EVALUATION OF A PUBLISHED PCR TECHNIQUE IN TRACKING THE SOURCE OF FECAL CONTAMINATION IN ALABAMA AND WISCONSIN ENVIRONMENTAL WATERS. D. Salter¹, M. Arrington¹, Q. Sonnier¹, G. Goldenstar¹ and M. Leuther², ¹Depart. Biol. Environ. Sci., UWA, Livingston, AL 35470; ²Leuther Laboratories, Coon Valley, WI 54623.

We previously reported our results on using a published PCR technique based on species specific *Bacteriodes* species (Appl. Environ. Microb., 2000, 66: 4571) for tracking fecal contamination in Alabama environmental waters (Poster Presentation, AAS 2003 Annual Meeting). In summary, analysis of environmental waters around Livingston, AL for human versus ruminant fecal contamination showed that all 8 sites were positive for *Bacteriodes* DNA; Five and 4 sites were positive for human and ruminant *Bacterioides* DNA, respectively. Research was suspended until we could eliminate reagent/equipment DNA contamination problems. We hopefully have solved these problems by physically separating the DNA extraction and preparation of the reaction mixes from the PCR instrument and gel electrophoresis analysis steps as well as using dedicated micropipettors at each location. We now report confirmation of our previous results as well as more extensive analysis of control samples. In addition, we also surveyed one of the human fecal-contaminated streams at 10 sites from the beginning of the stream until its end into the local river. All but 1 of the sites were positive for *Bacteriodes* DNA with 8 and 7 sites positive for human and ruminant *Bacterioides*, respectively. This technique was also used to analyze environmental waters collected weekly from several sites along a Wisconsin river during Summer 2005. Out of 143 samples, 110 were positive for ruminant *Bacteriodes* DNA and only 11 were positive for human *Bacterioides* DNA. Nine samples were positive for both. Further research will be reported.

THE COMBINED APPLICATION OF SONICATION AND ADVANCED CHEMICAL OXIDANTS AS A METHOD TO TREAT INTRODUCED AQUATIC MACROINVERTEBRATES TRANSPORTED VIA BALLAST WATER. Meghana Gavand*, James B. McClintock*, Charles D. Amsler*, Robert W. Peters⁺, *Dept. of Biology, Univ. of Alabama at Birmingham, AL 35294. ⁺Dept. of Civil and Environmental Engineering, Univ. of Alabama at Birmingham, AL 35294.

Introduction of invasive marine and freshwater invertebrates constitutes a growing threat to aquatic ecosystems. Ballast water is a major factor contributing to the introductions of aquatic invasive species. Three different life-history stages (cysts, nauplius larvae, and adults) of brine shrimp *Artemia salina* were chosen as model invertebrate life stages to determine the effect of individual and combined treatments of sonication and advanced chemical oxidants under static and continuous flow regimes. The sonication frequency, advanced chemical oxidation concentrations and treatment times were optimized based on previous studies with bacteria. The highest percent mortality obtained for individual treatments over a 5 min exposure was 17, 49 and 43% (static regime) and 16, 34 and 38% (continuous flow regime) for cysts, larvae and adults, respectively. The highest mortality obtained for combined treatments over a 5 min exposure using combined sonication, hydrogen peroxide and ozone was 83, 100, 100% (static regime) and 67, 100 and 100% (continuous flow regime) for cysts, larvae and adults, respectively. The combined treatments are synergistic and result in significantly greater mortality than individual treatments. Combined sonication and advanced oxidants may be an effective method to inactivate a variety of different life history stages of marine and freshwater invertebrates in ballast water. Supported by a grant from the US Fish and Wildlife Service to R. W. Peters, C. D. Amsler and J. B. McClintock.

SUMMER RESTING AREAS OF THE GULF STURGEON, *ACIPENSER OXYRINCHUS DESOTOI*, IN THE CONECUH/ESCAMBIA RIVER SYSTEM. Jon B. Sawyer and Paul M. Stewart, Department of Biological and Environmental Sciences, Troy University, Troy, AL 36082. Frank M. Parauka, U.S. Fish and Wildlife Service, Panama City Field Office, Panama City, FL 32405.

Once inhabiting Gulf coastal rivers from the Mississippi River to Tampa Bay, the Gulf sturgeon *Acipenser oxyrinchus desotoi* is now rarely found south of the Suwannee River in Florida. Among the Florida Panhandle rivers, the Conecuh/Escambia River contains the most suitable Gulf sturgeon habitat. Radio telemetry was used to track thirteen Gulf sturgeon within the Conecuh/Escambia River, during April through November of 2005, to locate sturgeon summer resting areas and to observe movement behavior. Only one radio-tagged sturgeon moved upstream into the Conecuh River, with the remaining study population observed in the Escambia River, below the Florida line. Three summer resting areas within the Escambia River were identified, and one previously located resting area was confirmed during this study. Movements within the summer habitats did not appear to be influenced by abnormally elevated flow volumes observed during this study. Substrates for the summer resting areas were recorded as primarily coarse sand, with little to no snags present. Water temperature cues for migration were found to be consistent with previous observations in other Gulf sturgeon rivers. Sedimentation, low dissolved oxygen concentrations, abandoned limb lines and a large logjam in the Escambia River were four major threats to the Conecuh/Escambia River Gulf sturgeon identified during this study.

CREVICE USE BY SALAMANDERS IN NORTHEASTERN ALABAMA WITH AN EMPHASIS ON THE GREEN SALAMANDER, *ANEIDES AENEUS*. Sara E. Viernum and George R. Cline, Dept. of Biology, Jacksonville State University, Jacksonville, AL 36265.

Northeastern Alabama supports a high diversity of salamanders, approximately twenty-eight species represented by five families (Ambystomidae, Cryptobranchidae, Plethodontidae, Proteidae, and Salamandridae). These salamanders utilize terrestrial, aquatic, and fossorial habitats. Crevice use by terrestrial, Plethodontid salamanders was studied at two locations in DeKalb County; DeSoto State Park and Boy Scout Camp Comer. DeSoto State Park was relatively undisturbed, while both undisturbed and heavily disturbed sites were found at Camp Comer. Crevices in sandstone rocky outcrops located in mixed deciduous forests were surveyed bi-weekly beginning in May 2005. Height, width, and distance to ground for each inhabited crevice were recorded at each site. Five species of salamanders were collected: *Aneides aeneus*, *Plethodon glutinosus*, *Eurycea longicauda*, *Pseudotriton ruber*, and *Notophthalmus viridescens*. The most abundant species were *A. aeneus*, *P. glutinosus*, and *E. longicauda*. These three species appeared in the crevices about the same time in May. Both *A. aeneus* and *P. glutinosus* were observed regularly, while *E. longicauda* occurred sporadically. *A. aeneus* occupied shorter and narrower crevices, while *P. glutinosus* occupied crevices that were higher from the ground. Only *A. aeneus* was found at the disturbed sites of Camp Comer. *A. aeneus* densities appear higher in the disturbed sites than the undisturbed sites. Seasonal activities were also recorded for *A. aeneus*. Morphological reproductive structures, such as well-developed yellow mental hedonic glands on males, were noted in June. A brooding chamber containing approximately eight eggs was discovered in August. Hatchlings from the brooding chamber appeared in October.

MICROTUBULE INVOLVEMENT IN BALBIANI BODIES OF *ACHETA DOMESTICUS* OOCYTES. Thomas G. McFaden, Karen G. Wolfe, and James T. Bradley, Dept. of Biological Sciences, Auburn University, AL 36849.

Previtellogenic oocytes of the cricket *Acheta domesticus* contain an opaque cytoplasmic Balbiani body (BB) at each pole. BBs are visible in living tissue by light microscopy, and TEM shows them to contain dense aggregates of mitochondria. A single BB first appears at the proximal side of the germinal vesicle during early previtellogenic development. As this BB migrates to the proximal pole of the oocyte, a second BB appears near the distal side of the germinal vesicle and subsequently migrates distally. The incidence of BBs in ovaries was scored in last instar nymphs using differential interference contrast microscopy to determine the frequency of ovarioles containing visible BBs. To determine whether microtubules (MT) play roles in BB migration and/or stabilization, animals were injected with colchicine to give an in situ concentration of 0.2 mM. The depolymerizing effect of the colchicine solution on MTs was established using HeLa cells and flow cytometry to detect mitotic arrest. Results indicated that colchicine induces disappearance or dispersal of BBs inside oocytes of live crickets. We conclude that MTs are required for normal BB morphology and behavior. Work is underway to localize MTs inside oocytes using immofluorescent microscopy.

MICROARRAY ANALYSIS OF LEAD TREATED *SACCHAROMYCES CEREVISIAE*. In Ki Cho and Christi Magrath, Department of Biological and Environmental Science, Troy University, Troy, AL 36082.

The genome wide effect of lead acetate on gene expression in *Saccharomyces cerevisiae* was assessed using microarray technology. *S.cerevisiae* cultures were exposed to varying lead acetate concentrations and total RNA was prepared from each sample. Global gene expression profiles were generated by hybridizing labeled RNA to microarray (gene chips) obtained from the Genome Consortium for Active Teaching. Comparative analysis allowed identification of lead acetate responsive (LAR) genes with approximately 68 genes identified as responsive (48 repressed genes and 20 induced genes). Continuing investigation of these strains will allow elucidation of lead response mechanisms in *S.cerevisiae*.

MOLECULAR ANALYSES OF CADMIUM TOXICITY IN ARABIDOPSIS, SORGHUM, AND TOBACCO. Rachel J. Dunkerley and Mijitaba Hamissou. Department of Biology, Jacksonville State University, Jacksonville, AL 36265.

Cadmium is a non essential heavy metal pollutant of the environment, resulting from agricultural practices, mining, and industrial activities. Because of its high water solubility, Cd is readily available for uptake by plants and aquatic animals. In plants, Cd has been shown to interfere with the uptake, transport, and use of several essential elements causing complex nutrient deficiency symptoms. Several plant species are known to uptake and store Cd in their chloroplast, therefore affecting various aspects of photosynthesis. Like other heavy metals, the toxic actions of Cd are believed to be exerted on metabolic enzymes by altering their active sites. Cd toxicity in plants is also characterized by a rapid increase in reactive oxygen species (ROS) creating therefore conditions for secondary oxidative stress. The objectives of this research are to investigate the effects of Cd on the activities of ROS scavenger molecules, superoxide dismutase (SOD) and peroxidase (PO) enzymes and on the photosynthetic activities of isolated chloroplasts in *Arabidopsis thaliana*, *Sorghum bicolor* and *Nicotiana tobacum* challenged with elevated concentrations of Cd. Plants were grown in potted soil at pH 6.9 and fed with various concentrations of CdCl₂ for 14 days. Toxicity index chlorosis was recorded daily. Biomass accumulation, SOD, PO, and chloroplast activities were determined at the conclusion of the experiments.

RED TEARS: PORPHYRIN AND THE REX RAT. Elizabeth Swift, The Altamont School, Birmingham, Alabama 35213.

The purpose of this project was to test the hypothesis that porphyrin secreted by the Harderian gland in Rex rats (*Rattus norvegicus*) in the form of "red tears" has antibacterial effects on bacteria that grow on Rex rats. The rats were swabbed for bacteria, which were then allowed to grow on agar plates. The rats were then swabbed for porphyrin, which was applied to colonies of bacteria. The porphyrin had no noticeable antibacterial effects. However, the bacteria harvested from the parts of the rat with no porphyrin on them were markedly different than those harvested from areas that had porphyrin.

THE ONCOGENE N-MYC AND ITS REGULATORY ROLE IN THE TRANSCRIPTION OF N-ACETYLGLUCOSAMINYLTRANSFERASE VB IN NEUROBLASTOMAS. Marae M. Bernard and Jeanette Runquist, Birmingham-Southern Col., Birmingham, Al, 35254. Karen Abbott and Michael Pierce, Univ. of GA CCRC, Athens, GA 30602.

N-acetylglucosaminyltransferase VB (GnT-VB) is an enzyme that catalyzes the glycosylation of β (1,6) branches on cell surface adhesion receptors. This glycosylation has been positively correlated with cell invasiveness. N-myc, an oncogene highly elevated in aggressive neuroblastomas, was theorized to have a potential link to the regulation of GnT-VB. To measure the effect of N-myc on GnT-VB expression, initial RT-PCR reactions were performed to measure basal levels of GnT-VB and N-myc in SK-N-SH, SH5Y, IMR32, and NBFL neuroblastoma cell lines. The levels of GnT-VB were positively correlated with N-myc levels in each cell line. Further investigation with RT-PCR revealed that the overexpression of N-myc in NBFL cell lines resulted in an 8-fold decrease in GnT-VB mRNA levels. Likewise, HEK cell lines transfected with an N-myc overexpression vector were detected to have decreased promoter activity. HEK cell lines transfected with the putative GnT-VB promoter mutated at the N-myc binding site were detected to have increased promoter activity, with wild type promoter activity at 2.92% of the positive control and mutant promoter activity at 29.6% of the positive control. In addition, when the N-myc overexpression vector was introduced in tandem with the mutant GnT-VB promoter, promoter activity decreased to 14% of the positive control. Overall, N-myc appears to negatively regulate GnT-VB activity, but further study is needed to clarify any distinct regulatory relationship.

SOME EFFECTS OF PHYLOXINE B ON *TETRAHYMENA PYRIFORMIS* IN VITRO. Misty Chapman, Mark Meade, Benji Blair and C. P. Olander, Dept. of Biology, Jacksonville State University, Jacksonville, AL 36265.

Phloxine B is a water-soluble halogenated xanthene dye that has recently gained popularity as an insect pesticide. Once ingested in baits, the dye is photoactivated causing tissue damage and the ultimate demise of the animal. Currently, researchers are examining the efficacy of phloxine B as an externally applied therapeutic bath for fish infested with protozoan. In this study, we examined the effects of various concentrations of phloxine B on *Tetrahymena pyriformis*, a closely related protozoan to the *Ichthyophthirius multifiliis* a more pathogenic species that reeks havoc on fish farming. Acute exposure at 10mg/L phloxine B after 8hr in the light significantly reduces the number of cells in culture. Chronic exposure to lower concentration on cell growth, oxygen consumption, and phagocytosis are reported.

CHEMISTRY

SYNTHESIS OF 4-AMINO DERIVATIVES OF 5,7-DICHLOROKINURENIC ACID THAT LED TO UNEXPECTED PRODUCTS VIA DETOSYLATION. Stephen Craig, Al Nichols, and Nagarajan Vasumathi, Dept. of Physical and Earth Sciences, Jacksonville State Univ., Jacksonville, AL 36265.

Starting with ethyl 5,7-dichloro-4-[[4-methylphenyl)sulfonyl]amino}quinoline-2-carboxylate prepared by a previously reported method (Nichols and Yielding, 1993), a reaction was conducted using triphosgene and glycine to produce the corresponding tosyl derivative of [[{[5,7-dichloro-2-(ethoxycarbonyl)quinolin-4-yl]amino}carbonyl]amino]acetic acid. It was anticipated that the tosyl group would then be removed by acid hydrolysis. Elemental analysis of a product isolated from this reaction revealed that the tosyl group was no longer a part of the quinoline ring compound. This detosylation had not been observed in previous studies (Nichols and Yielding, 1998). When this product was reacted with anhydrous ethyl alcohol in the presence of thionyl chloride, a product was obtained that was identified by proton NMR and elemental analysis as ethyl 5,7-dichloro-4-[(ethoxycarbonyl)amino]quinoline-2-carboxylate. The formation of a 4-amino isocyanate intermediate could explain these results.

INVESTIGATING THE ACTIVITIES OF β -GLUCOSIDASE AND INSULIN POTENTIATING FACTOR (IPF) IN BITTER GOURD (*Momordica charantia*) PROTEINS. Mijitaba Hamissou, Amanda Henderson, and Nagarajan Vasumathi. Jacksonville State University, Jacksonville, AL 36265

Plant products have always been important tools in drug discovery. Drug discovery usually requires a thorough investigation of biologically active compounds produced by the plant. β -glucosidase (3.2.1.21), an enzyme that hydrolyzes β -glycosidic bonds between the reducing side of glucose and an alkyl aglycone or oligosaccharide is a powerful tool used in drug discovery. Plant β -glucosidases belong to glycosyl hydrolase family and play important roles in defense, phytochrome regulation, oligosaccharide catabolism. Because of their involvement in deactivation or storage of some endogenous bioactive substances, β -glucosidases are used as indicators of drug-related activities in plant extracts. Bitter gourd, *Momordica charantia*, a common vegetable cultivated in India, is used as a folk medicine for treatment of many ailments including diabetes. Our objectives are to search for drug-related activities in bitter gourd extracts by investigating an insulin potentiating factor (IPF) and β -glucosidase activity. Bitter gourds were purchased from the International Market in Georgia, divided into mesocarp and seeds. Each portion was homogenized in Na_3PO_4 buffer and native enzymes were harvested by centrifugation. β -glucosidase activities were studied biochemically and IPF was investigated by western blot analysis against an anti-insulin antibody. Preliminary data indicated the presence of one of β -glucosidase substrates and a weak cross reactivity to anti-insulin antibody. Lipids were obtained from the seed portion and analyzed by TLC. Early lipid analyses indicated a possible presence the omega fatty acid linolenic acid that may play a role in the bioactive properties of the seed extract.

INVESTIGATING UPTAKE OF MERCURY FROM CONTAMINATED SOIL BY DECIDUOUS TREES IN CALHOUN COUNTY, ALABAMA. B. Driggers, J. Kent, C. Loveless, E. Pentecost, L. Pentecost, D. Steffy, and A. Nichols, Dept. of Physical and Earth Sciences, Jacksonville St. Univ., Ala., 36265.

Mercury contaminated landfill material has been used to landscape a city park and a nearby shopping mall, both of which are adjacent to Snow Creek in southern Calhoun County. An ongoing investigation of mercury occurrence in this watershed has found that the mercury from the fill material has been redistributing across the fluvial deposition system and has been bioaccumulating in various trophic levels of the freshwater ecosystem. This investigation extends the study to include the measurement of mercury uptake by Green Ash (*Fraxinus pennnsylvanica*), a deciduous tree occurring in the contaminated flood plain deposits, which have an average measured value of 0.56 mg/Kg. Based on 9 samples of each section of 3 different trees located in the same area, the root tissue consistently has the highest value (0.0134 mg/Kg), the trunk tissue has the next highest (0.0058 mg/Kg), and the twigs of the trees has the lowest values (0.0017 mg/Kg).

VALIDATION OF ALABAMA WATER WATCH TEST METHODS FOR TURBIDITY AND pH VIA COMPARISON OF PAIRED TEST KIT AND METER DATA. Michael William Mullen, Department of Environmental and Biological Sciences, Troy University, Troy, AL 36082.

State water quality management agencies seldom have the resources needed to monitor more than a small percentage of water bodies. The Alabama Water Watch Program has selected and obtained USEPA approval for monitoring methods used by citizen volunteers for water quality monitoring. While these methods do not provide the precision of research or agency protocols for water monitoring, they can provide useful trend data that would otherwise be unavailable. This paper examines the performance of volunteer methods for pH and turbidity by comparing volunteer data with meter data. Data obtained using the visual turbidity tube (LaMotte Company) used by volunteers was compared with data from a USEPA approved turbidimeter (LaMotte 2020 Turbidimeter). Data obtained from a visual wide-range colorimetric pH comparator (LaMotte Company) used by volunteers was compared with data obtained using pocket pH meters (YSI Model 10). Volunteer methods were found to compare favorably with the meter methods similar to those that might be employed by water management agencies.

EVALUATIONS OF CELLULOSE SUPPORTED PALLADIUM CATALYST Fatima Carmichael, Scott Brown, Kevin H Shaughnessy, Department of Chemistry and Center for Green Manufacturing, The University of Alabama, Box 870336, Tuscaloosa, AL 35487-0336

Palladium catalysts are widely utilized in coupling reactions such as Suzuki coupling. These reactions are becoming more commonly used in the synthesis of fine chemicals. For fine chemical synthesis it is desirable to have a catalyst that can be easily separated from the product stream. The focus of this research has been to use cellulose supported palladium catalyst and a sterically demanding phosphine ligand to promote cross-coupling reactions. Phosphine ligands promote reactivity of aryl halide substrates with boronic acid to generate biphenyl moieties. Cellulose is a renewable resource and it is compatible with aqueous solvent systems. It is also highly functionalized, which may stabilize the heterogeneous palladium catalyst. By evaluating cellulose supported reactions versus carbon supported reactions we hope to be able to find more efficient and sustainable heterogeneous catalyst for cross-coupling reactions.

EQUILIBRIUM CONSTANT CALCULATOR FOR CHEMICAL REACTIONS AT HIGH TEMPERATURES, E. B. Garner, and M. B. Moeller, Dept. of Chemistry and Industrial Hygiene, Univ. of North Alabama, Florence, AL 35632.

The National Institute of Standards and Technology (NIST) Chemistry WebBook contains thermochemical data on over 7000 organic and small inorganic compounds. An Excel workbook, K-equilibrium Calculator, has been constructed to facilitate the use of the NIST data for calculating values of equilibrium constants for chemical reactions from 298K to temperatures up to 6000K. The project objective was to create a calculator that would be easy to use, transportable, readily understood, easily modified, and accurate. Occasional small gaps in the NIST WebBook heat capacity values have been filled using a simple algorithm. Gibbs free energy values calculated with K-equilibrium Calculator agree well with values calculated from Free Energy Function tables. The workbook Calculator can be downloaded at www2.una.edu/mmoeller.

CHEMISTRY OF GLUCOSINOLATES: EXTRACTION AND CHARACTERIZATION

Tahirah Farrer-Bradley¹ N. Paul Nolen², Bernadette Early³, Ayesha J. Mindingall⁴, Monica Frazier⁴, Pamela M. Leggett-Robinson*¹ ¹Department of Chemistry, Tuskegee University, ²Department of Animal Science, Tuskegee University; ³Department of Biology, Tuskegee University; ⁴CBR/RCMI, Tuskegee University

Diets rich in cruciferous vegetables such as broccoli, cabbage, brussel sprouts, bok choy, and cauliflower, have been shown to lower the risks of one developing several cancers such as lung, pancreatic, breast and prostate cancer.¹⁻³ This decrease in cancer development has been attributed to a constituent of cruciferous vegetables, isothiocyanate, a derivative from the family of glucosinolates.^{3,4} Previous data show that the specific effects of a particular ITC on the metabolism of a given carcinogen must be determined independently as they vary from one carcinogen to another.^{2,5} Moreover, the effects of ITCs are dependent on the methods used to isolate the extracts, the specific carcinogen studied, and the target tissue involved.⁴ Methodology for analysis have not been uniformly applied and the actual chemistry of glucosinolates remains under investigation. Here we present data on the various methods for isolating ITCs from broccoli, cabbage, and bok choy as well as the proliferative effects of the isolated ITCs on prostate (PC-3) cancer cells.

SYNTHESIS AND STRUCTURAL DETERMINATION OF UREA FORMALDEHYDE CONDENSATION PRODUCTS Ryan J. Johnson, Thomas P. Murray and Jason P. Weisenseel, Dept. of Chemistry & Industrial Hygiene, Univ. of N. Ala., Florence, AL 35632

Many controlled-release nitrogen (N) fertilizers contain urea formaldehyde condensation products as their active ingredient. Fast acting N fertilizers commonly contain urea or ammonia that is digested by ammonia-oxidizing bacteria (AOB) in the soil to form nitrates. Nitrification of urea and ammonia by AOB is relatively fast and the digestion rate has been studied and is well understood. Urea formaldehyde condensation product nitrification by AOB is very slow resulting in the controlled release of nitrates. The kinetics of this enzymatic digestion has not been studied in detail and the slow rate of nitrification is poorly understood. Two urea formaldehyde condensation products, methylene diurea (MDU) and dimethylene triurea (DMTU), have been synthesized and characterized by NMR spectroscopy. The NMR data was used to model the three-dimensional structure of these compounds. The ultimate goal of this project is to measure the enzymatic digestion rates of these compounds and use the three-dimensional structures to rationalize the slow digestion rates.

HYMENOMYCETES (FUNGI) FROM THE MOBILE BAY AREA. Juan L. Mata, Dept. of Biological Sciences, Univ. of South Alabama, Mobile, AL. 36688

A survey of the fleshy fungi from the Mobile Bay and vicinities was started last year. A reason motivating this process was that the only published work on the mycoflora of Alabama dates back to 1905, with most of the collection records coming from Lee County and vicinities. Ongoing fungal forays in southern Alabama and vicinities allow us to document taxa previously reported but also increase our capacity for thorough revision of their taxonomic and systematic status. In the long term, a current list of reported macrofungal species will be generated, all of which will be backed by specimens deposited in a herbarium. Here, a progress report of such work is given.

STUDY ON THE EFFECTS OF 18-CROWN-6 IN SOLID PHASE PEPTIDE SYNTHESIS. James T. Merrill and Lesli K. Bordas, Dept. of Chemistry & Physics, Spring Hill College, Mobile, AL 36608.

Since its initial development in 1963, side reactions and incomplete couplings have plagued synthetic peptide synthesis. It is well known that intermolecular interactions between the growing peptidyl backbone and neighboring peptide chains cause the formation of "aggregates" and low coupling yields. This research introduces the use of crown ethers to shield the growing chains from such unwanted interactions. The crown ethers provide intramolecular bonding thereby disrupting secondary structure formation in the growing peptide chains. Progress in this type of chemistry will eventually help pharmaceutical companies produce large, hard to isolate proteins and enzymes that may be used as treatments or possibly even cures to many diseases.

DETERMINATION OF TOTAL MERCURY IN FRESHWATER MUSSEL TISSUE FROM THE TENNESSEE RIVER IN NORTHWEST ALABAMA, Nathan C. Thacker, Amanda W. Davis, and Jason P. Weisenseel, Dept. of Chemistry & Industrial Hygiene, Univ. of N. Ala., Florence, AL 35632

Since the discovery that mercury from industrial pollution was the cause of Minamata disease in Japan, mercury contamination in aquatic systems is a major human health concern. Mercury contamination in the Tennessee River of Northwest Alabama is of special concern since a major discharge of mercury from a chlor-alkali facility into Pickwick Lake occurred in the 1960's. Additionally, one of the few remaining chlor-alkali facilities in the United States is still operating in Northwest Alabama, as well as a coal burning steam plant on the banks of the river in Colbert County. Both of these operations are known to generate mercury vapor in the atmosphere that is believed to accumulate in the aquatic ecosystem. Mussels are good biological indicators of the health of aquatic ecosystems. In this study, the total mercury concentration in the tissue of mussels collected in this region is being determined by atomic absorption spectroscopy. Preliminary data indicates the presence of mercury in the mussel tissue. The ultimate goal of this project is to determine the mercury content in the mussel tissues and shells to provide a timeline and geographic distribution of mercury in the river system.

GEOGRAPHY, FORESTRY, CONSERVATION, AND PLANNING

GEOGRAPHICAL INFORMATION SYSTEMS (GIS) AS AN AID IN THE INVESTIGATION OF TRICHLOROETHYLENE (TCE) GROUND WATER CONTAMINATION ON AND NEAR THE ANNISTON ARMY DEPOT (ANAD). Thomas Baucom, William R. LaGrone, David Steffy, Physical and Earth Sciences, Jacksonville State University (JSU), Jacksonville, AL 36265, Brian S. Murray, Science Applications International Corporation, Oak Ridge, TN 37831, Patrick G. Smith, Directorate of Risk Management, Anniston Army Depot, Anniston, AL 36201.

Cooperation between ANAD and JSU with the support of other partners in the restoration of the depot under the Comprehensive Environmental Response, Compensation, and Liability Act is providing research opportunities for graduate students in the GIS and Environmental fields. A low cost and shareable GIS database is being built to inform the public, aid in the research of the movement of TCE in groundwater from ANAD towards Coldwater Spring (CWS), and to capture data from past studies of the area. To date, analysis of TCE levels in CWS has been inconclusive. Obstacles to data sharing and maintaining data standards are the major impediments to this ongoing effort. The authors are grateful to the staff members of the Anniston Waterworks and Sewer Board, the Environmental Protection Agency Region 4, and the United States Geological Survey, Alabama Water Science Center. The project is supported in part by the Oak Ridge Institute for Science and Education, Oak Ridge TN.

IMPACT OF AFRICAN AMERICAN CHURCHES ON THE ECONOMIC AND SOCIAL DEVELOPMENT OF THEIR COMMUNITIES. Kindell C. Anderson and Teshome Gabre, Dept. of Community Planning and Urban Studies, Ala. A&M Univ., Normal, AL 35762.

In African American history, "the African American church" has stood at the center of African American communities establishing itself as the preeminent source for religious and social enrichment. Churches have been the center of the community and a place that many members of the church and/or the community have turned to for help when financial or social difficulties arose. As the times have changed the demand of the church's assistance has gotten stronger and it has become necessary for the church to take a more direct and stronger role in the development of the communities they serve. This increased role in the interest of the community has often been as a means to fulfill a gap in social services. This study will evaluate the impact of African American churches in Madison County, Alabama on the social and economic development of their communities based upon the programs that are provided by the churches.

Key Words: Impact, African Americans, Churches

BASELINE STUDIES OF CYPRESS POND CREEK: A DISTRESSED URBAN WATERSHED. J. Cody Mayberry, Rosine W. Hall and John M. Aho, Auburn University Montgomery, Montgomery, AL 36124

Cypress Pond Creek flows west out of its urbanized watershed into the Alabama River in downtown Montgomery. Over the past one-hundred years it has suffered from a number of development-related insults, including pollution with chemical and industrial wastes, having a portion of its streambed covered and converted to storm drain, damming by railroad embankments, attempts at flood control by concrete-pouring and rip-rap deposition, and alterations in the land-use of its watershed. Recent water-quality data shows the creek to be higher in nutrients than comparable streams in Jefferson County. Our median dissolved oxygen of 9.4 mg/L meets the water quality standards of ADEM (5.0mg/L or higher) and suggests the stream is not currently impaired. Benthic sampling shows the in-stream faunal composition reflects that expected from an impacted stream, with reduced diversity and overrepresentation by leeches and chironomids which would suggest low levels of dissolved oxygen. The main flow of the creek now comes from a gravel pit found outside of its natural watershed. Despite the problems, we noted a beaver and some tolerant species of family Centrarchidae still inhabiting the creek. Though this creek has been adversely affected by the urbanization of the surrounding areas, we believe it is capable of restoration to improve ecological integrity.

THE IMMIGRATION CONTROVERSY. James G. Alexander, Alabama A&M University, Normal, AL 35762 and Paulette S. Alexander, University of North Alabama, Florence, AL 35632.

Globalization is one of the defining characteristics of our time. Economists generally have been highly supportive of the argument that economic integration among countries is desirable. This is especially true regarding cross-national movement of goods. The mutual advantages of "free trade" are routinely taught at the principles level, usually without much consideration of "fair trade" issues. In the abstract, economists tend to favor relatively unfettered cross border flows of productive factors, most notably capital. Although there are, from time to time, controversies regarding asset ownership within a country (such as the present ports issue), there is widespread agreement in principle that international capital movement is beneficial. There is much greater controversy with respect to cross border movement of labor. One cannot totally dismiss the notion that immigration is treated differently as a result of power differentials between capital and labor. Much of the controversy regarding immigration, however, reflects the simple fact that that movement of a factor of production is accompanied by the movement of individuals—and sometimes families. This research addresses the economic, security, and cultural controversies generated by this movement.

HURRICANE IVAN AND THE HAZUS MODEL. Greg G. Gaston, Associate Professor, Geography, University of North Alabama , Florence, AL 35632

2004's Hurricane Ivan had tremendous impact on communities in Alabama. In the United States FEMA has developed a model that helps predict damage from multiple hazards, including hurricanes. FEMA has invested \$40 million since 1997 developing and improving the HAZUS model. The HAZUS_{MH} model was released in October of 2003. This model is used by FEMA to predict wind field damage. This paper presents the results of research as follows:

1. Peak wind gusts from the HAZUS_{MH} model on the track actually taken by hurricane Ivan; extending the analysis from the HAZUS_{MH} model for the full length the route of Ivan as it tracked across Alabama.
2. Compare model predictions of wind gusts with recorded wind gusts along the storm track.

Wind velocity data (peak gusts) were gathered from Mesonet stations across Alabama and from ASOS (Automated Surface Observing System) weather reporting stations. These observations were compared with the model predictions. A total of 20 stations were used for Alabama. The HAZUS model overestimated wind gusts for Ivan as it tracked over Alabama. Other comparisons for other hurricanes indicate that this is common for the HAZUS model. In contrast to the research assumptions, the model predictions actually improve as the hurricane tracks inland. Near the coast, model predictions were commonly twice the magnitude of the recorded gust. As Ivan tracked inland, the accuracy of the model predictions increased dramatically.

PHYSICS AND MATHEMATICS

REAL-TIME ON-LINE MONITORING OF TRACE ELEMENTS IN DIFFERENT MEDIA USING LASER INDUCED BREAKDOWN SPECTROSCOPY. Akshaya Kumar and Prakash C. Sharma, Department of Physics, College of Engineering, Architecture and Physical Sciences, Tuskegee University, Tuskegee, AL 36088.

It is shown that LIBS is a sensitive technique that can detect the concentration of different elements in water, soil and air in parts per million or billion scale would of great use to protect the lives from the disaster. LIBS technique has been used to monitor the concentration the concentration of trace elements like , Cadmium, Mercury and other toxic elements in soil, water and air. In addition the application of LIBS in biological sciences including the detection of cancer will be presented. A clear distinction between the LIBS spectra of normal and malignant tissue has been observed. The intensity of various elements, which is related to the concentration of trace elements in normal and malignant tissue, were significantly different. A significant differences in the relative concentration of Ca, Al, Fe, Cu, Na, K , Fe and Mg in normal and malignant tissue has been observed.

BULK CRYSTAL GROWTH OF PIEZOELECTRIC $\text{Pb}(\text{Mg}_{1/3}\text{Nb}_{2/3})\text{O}_3\text{-PbTiO}_3$ SINGLE CRYSTALS*. F. Kochary, M. D. Aggarwal, R. B. Lal, and A. K. Batra, Department of Physics, Alabama A&M University, Normal, AL 35762.

Piezoelectric single crystals of $\text{Pb}(\text{Mg}_{1/3}\text{Nb}_{2/3})\text{O}_3\text{-PbTiO}_3$ (PMN-PT) show superior properties to piezoelectric ceramics and piezoelectric films in device applications. However, the applications of PMN-PT single crystals are limited by the lack of a simple and reproducible growth technique. By using the high temperature flux method, we have successfully grown PMN-PT single crystals in our laboratory. The size of the obtained crystals varied from 1 to 4 mm, mostly showing regular prismatic shape. In order to get bigger size PMN-PT single crystals, we have successfully used a similar high temperature method with no flux. The size of the grown crystals by this method was relatively big and varied from 5 to 20 mm. The microstructure and the growth mechanism of the as-grown single crystals were investigated by scanning electron microscopy. From simultaneous differential calorimetry and thermogravimetric analysis (SDT) measurements, we have found that PMN-PT melts at 1264.12°C . The long wave-length optical modes in PMN-PT single crystals have been investigated using Raman scattering measurements.

* This work was supported by U.S. Army Space and Missile Defense Command, contract W9113M-04-C-0005.

ON CONDITIONAL DIFFERENCE ASYMMETRY MODELS IN SQUARE CONTINGENCY TABLES WITH NOMINAL CATEGORIES. Bayo H. Lawal, Dept. of Mathematics, Auburn University Montgomery, Montgomery, AL 36124.

In this paper, we implement the conditional difference asymmetry model (CDAS) for square contingency tables with nominal categories with the use of the non-standard log-linear model formulation approach. The implementation is carried out by fitting the CDAS model to the 3 x 3 table in Tomizawa *et. al.* (2004). We extend this approach to a larger 4 x 4 table of religious affiliation. We further obtained a measure of asymmetry along with its asymptotic standard error and confidence bounds. The procedure is implemented with SAS PROC GENMOD but can also be readily implemented in SPSS.

ANALYTICAL SOLUTIONS FOR PRESSURE AND DENSITY OF AIR IN MINES. A. Tan, T.X. Zhang and V. Bhatnagar, Dept. of Physics, Ala. A&M Univ., Normal, AL 35762.

The deepest mine in the world is over 3.5 km deep from the surface level. From the observed temperature profiles within mines, the pressure and density of air are calculated by integrating the governing equations for the number density obtained from the hydrostatic equation and the perfect gas law. Two models for the acceleration of gravity are used, taking into account the centrifugal acceleration due to the rotation of the Earth. The variation of acceleration of gravity with depth is seen to have only minimal effects on the pressure and air density. The high temperatures inside the mines result in very high pressures. Interestingly, however, the density of air within the mines greatly depended on the temperature gradient – the density can increase rapidly with depth, remain constant, or actually decrease, depending upon the value of the temperature gradient.

GROWTH AND PHYSICAL CHARACTERIZATION OF SCINTILLATOR CRYSTALS FOR HOMELAND SECURITY APPLICATIONS. R. Hawrami, M. D. Aggarwal, F. Kochary, R. B. Lal, A. K. Batra, Dept. of Physics, Alabama A&M Univ., Normal, AL 35762, and Gerald J. Fishman, NASA/Marshall Space Flight Center, National Space Science and Technology Center, Huntsville, Alabama 35805-1912.

Bulk single crystals of anhydrous cerium doped lanthanum bromide $\text{LaBr}_3:\text{Ce}$ a relatively new scintillator material has been successfully grown from melt using Bridgman-Stockbarger technique. Synthesis of the anhydrous lanthanum bromide was carried out in our laboratory using ammonium halide process. Overcoming initial difficulties, we were able to design the experimental set up to synthesize anhydrous lanthanum bromide using two consecutive reactions. Starting materials of lanthanum oxide and excess of ammonium bromide are made to react at 250°C to form a lanthanum bromide complex. Second reaction is carried out at 350°C in vacuum to sublime the excess ammonium bromide and anhydrous lanthanum bromide was successfully synthesized. 0.5% Cerium bromide is used as a dopant and the material was sealed in a 15 mm quartz ampoule with conical tip and crystals were successfully grown. Initial characterization was carried out at NASA laboratories and scintillation properties were observed. In the second attempt to grow crystal in one inch ampoule was unsuccessful and the ampoule blew up. Reasons for this mishap are under investigation. Results of synthesis and crystal growth parameters will be presented.

* This work was supported by NASA cooperative agreement NCC8-250 and NSF HBCU-RISE project HRD-0531183.

THE HISTORY OF THE MOST FAMOUS ERROR IN GRAPH THEORY. V.Voloshin, Dept of Mathematics, Troy University, Troy, AL, 36082.

We discuss the history of the famous four color problem, beginning with the proof and error by Kempe and ideas and results which followed.

PLASMA DIAGNOSTICS WITH ELECTRICAL PROBES. Anastasia V. Tarasova, Nirmol K. Podder, and Ralph B. Wilson IV, Department of Mathematics and Physics, Troy University, Troy, AL 36082.

Plasma is a high energy electrically charged mixture of ions and electrons. In a plasma the electrons are stripped from the atoms, creating a substance that resembles a gas but that conducts electricity very efficiently. This electrical property of plasma can be used to infer plasma parameters, such as electron number density, ion density, electron temperature, plasma potential, etc. There are several electrical probe techniques including single Langmuir probe, floating double probe, emissive probes, etc. developed over the years. In this research, some of these probes are used to measure the plasma properties of a glow discharge plasma. The presentation includes the design of an electrical probe, theory, and data analysis as well as some results.

USE OF TECHNOLOGY IN ENHACING UNDERGRADUATE CALCULUS TEACHING: WHAT WORKS? Fayequa B. Majid, Dept. of Mathematics, Alabama A & M University, Huntsville, AL 35762.

Calculus is the gateway to higher-level mathematics courses and a solid understanding of calculus is essential. Due to abstract and complex nature of the subject, many students fail to fully comprehend the subject matter. For last two decades technology is being used to combat this problem. Research suggests that technology used inappropriately has no significant effect on the student outcome. Moreover, there is substantial evidence that Computer Algebra System (CAS) used for symbolic calculations lead to conceptual understanding. The key element in the conceptual understanding is that the students construct their own knowledge while the instructors serve as facilitators. In this paper the author will present carefully structured exercises. The students will provide the answers to these exercises using CAS, thus constructing their own knowledge

ANALYSIS OF FLUCTUATIONS IN PLASMA POTENTIAL. Ralph Wilson, Nirmol Podder, and Anastasia Tarasova, Department of Mathematics and Physics, Troy University, Troy, AL 36082.

A dynamical systems approach is taken in characterizing the fluctuations in electric potential of a glow discharge argon plasma. Using a high voltage probe, fluctuations in potential are collected over a characteristic time interval. The measurements are repeated at a constant gas pressure for various fixed currents. The measurements for the time series show intermittent periodic and chaotic fluctuation regimes. The one dimensional time series are projected into an n-dimensional phase space by the *time delay reconstruction* method. This construction will be used to compute various parameters such as *correlation dimension*, *Lyapunov exponent*, etc. which can reveal a system's dynamical behavior.

FLUORESCENCE STUDY OF SUNSCREENS IN HETEROGENEOUS NANOSPHERE MEDIA. Rajagopal Krishnan and Thomas Nordlund, Department of Physics, University of Alabama at Birmingham.

Sunscreens applied to skin are primarily observed to be located in a complex environment of outer epidermal layer called stratum corneum. Studying basic optical properties of sunscreens which are supposed to act like an optical filter is difficult in a realistic environment like heterogeneous epidermis. Hence, UV absorption and transmission properties of sunscreens are often studied in solvent which does not mimic the skin, or they are studied in complex artificial skin systems which are difficult to handle and expensive to perform. Studying the fluorescence emission of sunscreens in heterogeneous nanosphere environment and comparing the result with emission of sunscreens in skin cell and excised skin, we concluded that the polystyrene spheres in buffer can serve as mimic for skin, by presenting polar/apolar environment observed in living tissues. We will present the fluorescence emission results of octyl salicylate, octyl methoxy cinnamate and padimateO and our proposed method to obtain their approximate protection factor by using the fluorescence spectroscopy and polystyrene nanospheres. Acknowledgements: Supported in part by a grants from NCI (CA94327), NIH grants R01 CA86172 (CAE), P30 AR050948 (UAB Skin Diseases Research Center) and from VA grant 18-103-02 (CAE) and from the University of Alabama at Birmingham (Preparing Future Faculty award and GAPF graduate fellowship, support of R. K.).

REALIZATION PROBLEMS IN PONTRYAGIN SPACES. Sergey Belyi,
Dept. of Mathematics & Physics, Troy University, Troy, AL 36082.

The realization problems for the Krein-Langer class N_κ of matrix-valued functions are being considered. We found the criterion when a given matrix-valued function from the class N_κ can be realized as linear-fractional transformation of the transfer function of a system of the M. Livsic type with the main operator acting on a rigged Pontryagin space Π_κ . We specify three subclasses of the class $N_\kappa(R)$ of all realizable matrix-valued functions that correspond to different properties of a realizing system, in particular, when the domains of the main operator of a system and its π -adjoint coincide, when the domain of the π -hermitian part of a main operator is dense in Π_κ . In the case when $\kappa = 0$ we obtain the realization results for Herglotz-Nevanlinna matrix-valued functions via conservative systems established earlier.

RECENT SHOCK WAVE DYNAMICS RESEARCH IN TROY. Nirmol K. Podder, Anastasia V. Tarasova, and Ralph B. Wilson IV, Department of Mathematics and Physics, Troy University, Troy, AL 36082.

Shock waves are very strong pressure waves that travel at supersonic speeds (> 343 m/s in air) and are generally produced by supersonic aircraft, lightning, spark, explosions, etc. In a supersonic flight, a bow shock is produced around the nose of the aircraft. At an increasing speed, this shock wave grows even stronger creating huge amount of drag forces on the aircraft. The result is a lot of fuel consumption without any significant gain in aircraft's speed. Here, the research attempts to address the issues relating to the shock wave drag reduction. It was found earlier that a shock wave accelerates in a plasma medium as oppose to a neutral gas medium like air. A spark generated shock wave is allowed to travel through a glow discharge plasma while a laser-deflection diagnostic measures the speed of the shock wave. A comprehensive set of measurements for the isolation of the plasma and gas parameters responsible for shock acceleration in plasma are currently underway to increase our understanding of shock wave drag reduction.

SOME SIMPLE PROOFS OF THE SUMS OF SOME ALTERNATING SERIES. Hussain Elalaoui-Talibi, Department of Mathematics, Tuskegee University, Tuskegee, Alabama 36088. Jermaine J. Ferguson, Department of Mathematics Tuskegee University, Tuskegee, Alabama 36088.

We give some simple proofs of the classical results.

INDUSTRY AND ECONOMICS

AN ANALYSIS OF THE EFFECTS OF URBAN SPRAWL ON SOCIAL ENVIRONMENTALISM AND GREEN MARKETING STRATEGIES. Dana R. Harris, Dept. of MGT & MKT, Alabama A&M Univ., Normal, AL 35762.

Consumers have had a moderate level of concern and respect for nature for hundreds of years. The term environmentalism became a focal point during the 1960s, and since then society has evolved to the point where virtually every industry, business, home, and consumer is affected by controlled and uncontrolled commercial growth and concerns about environmentally-friendly goods and services. Researchers have coined the term urban sprawl to identify unsustainable growth. As the housing market and businesses expand, a direct threat to the ecosystem can easily be identified. Green or environmental marketing identifies industry efforts to develop marketing mix strategies for products that have the least amount of impact on the environment as possible. Non-toxic packaging and products made from recycled materials allow organizations to demonstrate social responsibility and at the same time keep a focus on reasonable profit expectations. The average consumer will express an interest in the protection of the environment, but not many are aware of the costs of producing and marketing products that are considered safe for the environment. Densely populated areas experiencing unsustainable growth will need to create a balance of economic competitiveness with smart growth strategies. The key to understanding the effects of urban sprawl on social environmentalism and creating effective marketing strategies for environmentally-friendly goods and services is to increase the amount of available information, both scientific and unscientific, to the organization and its stakeholders.

THE MACROECONOMY IN PERSPECTIVE. James G. Alexander and Marsha D. Griffin, Alabama A&M University. Normal, AL 35762.

The present is existential, but its meaning is metaphysical—or at least historical. While what is is, how we understand it depends largely on what was. For example, understanding the implications of modern anti-Semitism requires at least an awareness of the Holocaust. Understanding the meanings and implications of current economic events and measures likewise requires some awareness of what went before. With the release of month-to-month or quarter-to quarter economic reports, the changes are often reported as “new records”—i.e., either higher or lower than that which immediately preceded. In reality, they usually are not. In economics, as in the rest of life, what is happening at the moment is not necessarily the best or the worst ever—or even the most important. A proper understanding of macroeconomic performance requires some perspective, which is what this paper seeks to provide.

HYBRID VEHICLES: HISTORY, CURRENT STATUS, AND SALES FORECAST. Marsha D. Griffin, Qian Shen, and James G. Alexander, Alabama A&M University, Normal, AL 35762.

A hybrid vehicle is one that uses more than one type of fuel. Currently the most feasible hybrid is thought to be one which uses both an internal-combustion engine powered by gasoline and an electric motor powered by batteries. The history of alternative fuel vehicles goes back to the period 1665 – 1680, during which time Ferdinand Verbiest created plans for a miniature four-wheel unmanned steam “car” for Chinese Emperor Khang Hsi. Other historical milestones include the first electric vehicle (1839), built by Robert Anderson, Scotland, the U.S.A.’s first venture into automobiles (1900), including production of over 1,600 steam and 1,575 electric cars, the first patent issued in the U.S.A. for a petrol-electric hybrid vehicle (1905), GM’s introduction of its first experimental hybrid car (the 512 in 1969), the first conversion of a standard car into a hybrid car (1979), the first hybrid car to hit the mass market in the United States (Honda’s Insight, 1999), the first hybrid four-door sedan available in the U.S. (Toyota’s Prius, 2000), and the first U.S.A.-made hybrid and the first SUV hybrid, Ford’s Escape (2004). There are currently 11 hybrid models available in the market; 2005 sales were almost 206,000 units. Japanese car makers control over 95% of the market. Experts predict that by 2012, up to 40 models will be available in the U.S. market, with a combined planned annual production of 650,000 units (about 4% of total U.S. demand).

SCIENCE EDUCATION

GRAPHIC ORGANIZERS AS TOOLS TO DIFFERENTIATE SCIENCE INSTRUCTION IN THE SECONDARY CLASSROOM. Marla Johnson, Marian Parker, Jessica Anderson, and Janet Gaston, Dept. Biol. & Env. Sci, Dept. Curriculum & Teaching, Troy University, Troy, AL

A requirement of RED 4484, Reading in the Content Areas, is to tutor a struggling student in grades 6-12. Students enrolled in the SCI 4481, Methods & Materials for Secondary Science Teacher, are required to incorporate graphic organizers into the lesson plans developed for a teaching unit. In the BIO/ CHM/ SCI 4474, Internship in Science Education, pre-service science teachers are encouraged to develop and use graphic organizers as part of their daily lesson plan activities. The appropriate graphic organizers from the Makes Sense Strategies are being used to assist the candidates in helping their students organize notes and study information. In Fall Semester, 2005, one of our General Science Education candidates tutored a local high school young man, who had been diagnosed with a learning disability. With the use of graphic organizers as a study tool, the young man prepared for and successfully completed the Alabama High School Graduation Exams.

DEVELOPING THERMODYNAMICS USING A COMPOSITE HEAT ENGINE. Christopher King, Dept. of Chemistry, Troy University, Troy, AL 36082

The Carnot cycle is often used to derive a mathematical expression for the 2nd law of thermodynamics. This method does not make clear what thermodynamic temperature is, and provides little insight, since a specific substance (an ideal gas) is used, rather than a general substance. The composite heat engine approach avoids these problems. The composite engine is 2 simple engines with a heat reservoir at an intermediate temperature between them. The talk will show how a composite engine can be used to increase student understanding of the 2nd law.

CELLULAR RESPIRATION: CONCEPTS AND LABORATORY EXERCISES. M. Sue Thomson, Rosine W. Hall and Janice B. Lynn, Auburn University Montgomery, Montgomery, AL 36124.

Cellular respiration is the foundation of any organism's energy metabolism but is one of the most difficult concepts to teach because it is an abstract topic largely unfamiliar to students, occurring at a scale that they cannot directly observe. We have developed and will present a hands-on laboratory exercise illustrating the concepts and processes of cellular respiration appropriate for use in college-level introductory biology classes. We experimented with the idea of using different substrates to be able to investigate variations in enzymatic activity. We also tested a tube-in-tube design after an Internet search yielded a computer-based simulation similar to what we envisioned. Our protocol uses a tube-in-tube design with six sugar substrates at the same molar concentration, bromothymol blue as the indicator and yeast as the subject organism. It is a safe, consistent exercise that students themselves can do with readily available laboratory equipment. By the end of the exercise, the students should be able to demonstrate their understanding of cellular respiration, enzymatic activity, and the scientific method through observation, experimentation, and application.

A MICROBIOLOGY LABORATORY EXERCISE FOR THE ISOLATION AND CHARACTERIZATION OF HALOPHILIC AND HALOTOLERANT BACTERIA FROM ALABAMA SALINE ENVIRONMENTS. D. Salter, Depart. Biol. Environ. Sci., UWA, Livingston, AL 35470.

As science instructors, we would like to generate student excitement about the sciences as well as stimulate us to be better teachers. I am a microbiologist by training and, in another life, completed a MS degree working with halophilic (ocean) bacteria. After joining the faculty of the University of West Alabama 11 years ago, I was again introduced to halophilic microbes after a 25 year lapse due to military obligations, completion of a Ph.D., post-docs, and research positions with other research interests. Biologists at UWA and other institutions have performed research at an inland saline site in Alabama located near Jackson, AL in the Fred T. Stimpson Wildlife Sanctuary. The salinity ranges from 0 to over 50 ppt and, in some cases, to over 100 ppt. I have collected water/mud from this area as well as water/mud/sand from brackish and ocean waters around the Mobile-Pensacola area, water/mud from freshwater streams as "controls", and water/mud from old Winogradsky columns made from these materials. These materials were used in the laboratory part of my Microbiology course to teach the following concepts and techniques: media making (solutions, dilutions, mathematics for biologists, and metric system), types of media (emphasizing complex, synthetic, enrichment [high salt], and selective [high salt] types), aseptic techniques, inoculation, streaking of plates for colony isolation and characterization, microscopy, simple and differential staining, cell and cell arrangement morphology, size determination (metric system and calibration of the microscope), salinity determination with dilutions, salt requirements for growth, and physiological tests. Details on the results from my Fall 2005 semester course will be presented.

ETHNOBOTANY IN SCIENCE EDUCATION AT THE UNIVERSITY OF ALABAMA AT BIRMINGHAM. Loretta A. Cormier, Dept. of Anthropology, Univ. of Ala. at Birmingham, Birmingham, AL 35294.

The Anthropology Program at the University of Alabama at Birmingham has developed a Spring mini-term course in ethnobotany. The course contains four components: theory, ethnography, plants, and hands-on learning. Lecture material includes the first two components: basics in ecological anthropological theory and study of indigenous Native American groups of Alabama. Students were then assigned 10 native plants to study in depth, including both plant ecology and their uses by Native American cultures. The course culminated in students designing a small Native American ethnobotanical garden on the UAB campus grounds.

EXAMPLES AND STRATEGIES FOR TEACHING ARCHAEOLOGY AND FIELD-BASED SCIENCES. Sharyn R. Jones, Dept. of Anthropology, University of Ala. Birmingham, Birmingham, AL 35294

The ever increasing technological savvy of students and their apparently diminishing attention span provokes a consideration of teaching methods and the evaluation of possibilities for improving teaching settings, lecture formats, and presentation style in an effort to appeal to students enmeshed in a high-speed high-tech culture. I evaluate my own experiences as a student and reflect upon positive educational situations that had long lasting effects on my intellectual development. I also draw from my experiences as an instructor to describe useful teaching strategies and to illustrate potentially effective ways to bring field-based sciences to life. Archaeology, like many field-based sciences generates copious amounts of material data. Artifacts, bones, shell, botanical remains, and other items are helpful for teaching laboratory methods and can act as illustrative objects in a variety of courses within the discipline. Other forms of data such as maps and photographs form an additional source from which to expose students to visually stimulating media for teaching purposes. Providing students with hands-on experience with material culture in the laboratory and/or classroom is a memorable event that often leaves participants with a positive impression of science.

LAUNCHING A SCIENCE AND TECHNOLOGY FOCUSED UNDERGRADUATE PROGRAM: CHALLENGES AND SUCCESSES. Diane Tucker, Science and Technology Honors Program, Univ. of Ala. at Birmingham, Birmingham, AL 35294.

UAB launched the Science and Technology Honors Program in Fall 2006. This interdisciplinary program prepares engineering and science students to be leaders and generators of new knowledge in their field. Students participate in interdisciplinary seminars, a scientific communication course, and an intensive mentored research experience with a faculty member. Challenges have included: establishing the Science and Technology Program as unique and distinct from the existing UAB Honors Program, working within the core curriculum to provide an enhanced honors experience in both science and related non-science courses, coordinating an effective learning experience for students within interdisciplinary courses involving many faculty, maintaining the interdisciplinary theme of the program while providing opportunity for in depth problem analysis, transferring leadership for outreach and social activities to the students. Successes have included: large pool of qualified applicants for 2006-2007 class, Enthusiastic support from UAB administration and academic community, cohesion among students, involvement of students in science related and non-science related community outreach activities, broad interdisciplinary exposure of students to science and technology research through seminars and hands on experience. The vision of the program and implementation of the freshman curriculum will be described.

BEHAVIORAL AND SOCIAL SCIENCES

RAVERS AND THEIR CULTURE OF DRUGS. Jeffrey Lee, Dept. of Criminal Justice, Troy University, Troy, AL 36382. Jessica Cotton and Sarah Connor Dept. of Criminal Justice, Troy University, Troy, AL 36382.

Raves are all-night dance parties that feature frenetic music often accompanied by laser lights and video shows. The rave culture in American society is popular among teens and young adults. Peace, love, unity, and respect are all elements of this culture; however, raves are frequently plagued by illicit drug sales, distribution, and use. This presentation examines the development of the rave subculture while focusing on its birth in Ibiza, an island off the coast of Spain, to its emergence in rural England, to the current rave format in the United States. The presentation will describe rave activities and various aspects of the raver lifestyle. Lastly, it will examine commonly abused drugs at raves and analyze public health concerns associated with these parties.

POLICE UNDERCOVER OPERATIONS: TECHNIQUES FOR DRUG ENFORCEMENT AT RAVES. Jeffrey Lee, Dept. of Criminal Justice, Troy University, Troy, AL 36382. Brent Paterline, Dept. of Criminal Justice, North Georgia College and State University, Dahlonega, GA 30597.

Raves are social events in modern youth culture that involve all night dance parties where the participants experience a sense of community and a heightened state of consciousness through hearing and responding to the music. Furthermore, law enforcement officials view raves as places where drugs such as MDMA, Ketamine, GHB, LSD, and marijuana are warehoused, sold, dispensed, and used. The purpose of this paper is to provide an overview of methods of operation used by undercover narcotics agents when working raves. Specifically, it will focus on lessons learned during a statewide crackdown on raves and club drug activity called "Operation Heat Rave." The paper describes the rave subculture and its themes of PLUR, vibe, technology, pleasure, and excess. It will discuss the evolution of raves from its European roots to the present day form in North America. Many communities have experienced problems associated with raves. They have responded by passing ordinances prohibiting late night dancing, establishing curfews for minors, and aggressive enforcement of other law violations associated with raves. The paper analyzes law enforcement strategies and responses to rave activity. The researchers identify common challenges and obstacles encountered by undercover officers working raves. Moreover, they offer potential solutions that may be effective responses to illicit drug activity associated with raves.

A CULTURE OF CHEMICALS: PREMATURE DEATH IN WRESTLING. Jason W. Lee, Department of Kinesiology, Troy University, Troy, AL 36082. Jeffrey Lee, Department of Criminal Justice, Troy University, Troy, AL 36082.

Sports are filled with numerous paradoxical issues. One such instance is identified by the potential for sport activity to be healthy, as well as unhealthy. Sports, by nature, are inherently based on athleticism, fitness, strength, and other seemingly healthful benefits. Though such benefits are possible and even commonplace, there is the constant presence where the unhealthy side emerges. Professional wrestling has been wrought with unhealthy and even deadly associations. Perhaps the most troubling of all has been the undeniably high presence of premature deaths. Many of these deaths are either directly or indirectly linked to drug abuse. The purpose of this study is to investigate the alarming rate of premature, drug-related deaths within the subculture of professional wrestling. This qualitative case study examines these drug-related fatalities, which have included some of the most prominent names in modern wrestling history. Through document analysis and interviews, this work is an examination of the dilemma associated with this pseudo-sport's "culture of chemicals." This case study includes an analysis of the prevalence of death including detailed accounts of the characteristics involved in these premature deaths and an examination of commonly abused drugs contributing to these unfortunate deaths. Through examining the abundance of deaths associated with professional wrestling, the researchers seek to identify explanations for the obviously disproportionate rates of mortality and look for related implications in more traditional sports.

STUDENT HAZING: A DANGEROUS SOCIAL BEHAVIOR. Traveis J. Guy, Dept. of Criminal Justice and Social Sciences, Troy Univ., Troy, AL 36081.

Hazing is a social tradition that affects the lives of many college and high school students nationwide. Factors that contribute to the continuance of hazing practices include the social structures that exist within society, the misconception that it is socially acceptable, a lack of adult supervision and willingness of students to participate. This research identifies the social implications that have sustained the tradition of hazing on school campuses, mainly in the area of victim participation. The assessment of data provided by the Bureau of Justice Statistics and Alfred University researchers illustrates the dramatic increase of dangerous hazing incidents that have been reported on college and university campuses in the past decade. Many school administrators have incorporated new campus anti hazing policies to curtail the dilemma, but those efforts fall short as each year thousands of students report occurrences of hazing and sadly, a few lose their lives as a result of the practice. The ramifications of hazing studies have caused government agencies and non profit organizations to designate advocacy programs towards aiding victims, preventative hazing education, and more specific punishments for offenders.

LEAPS: A COLLABORATIVE PROJECT BETWEEN SPORT MANAGEMENT AND CRIMINAL JUSTICE AT TROY UNIVERSITY. Jeffrey Lee, Department of Criminal Justice, Troy University, Troy, AL 36082. Jason W. Lee, Department of Kinesiology, Troy University, Troy, AL 36082.

The researchers have been involved with a series of studies designed to assess the fitness levels of public safety professionals. These assessments consistently describe officers as being "obese" or "overweight," and having "poor" or "very poor" VO₂max fitness scores. In 2005 the Sport Management and Criminal Justice departments at Troy University embarked on a project to provide a public service for public safety professionals in Southeast Alabama. The LEAPS (Law Enforcement And Public Safety) softball challenge was created to promote fitness, camaraderie, and positive interdepartmental relationships among public safety agencies. Furthermore, the project provided an opportunity for students to participate in service learning activities that supported the success of the event. Criminal justice students created a database of names and contact information of all law enforcement, fire, corrections, and emergency medical service agencies in the wiregrass area. Students then personally contacted the agencies to promote the event and invite the agencies to participate. Sport management students participated in fundraising projects that included registration and sponsorship, provided first aid, and supervision at the athletic event. In an effort to create an annual event, an evaluation was conducted to identify successes and future considerations. Participant satisfaction and fundraising were identified as successes, while lack of participation and sportsmanship issues were among the challenges. Future considerations may include adding events and forming an advisory board.

SENTENCING TRENDS IN CHILD MOLESTATION CASES. Victoria Mechtly, Sabrina Robinson Dept. of Criminal Justice, Troy University, Troy, AL 36081.

Child molestation is defined as the unwanted sexual attention or abuse of a child. It is a devastating crime, so offensive to society that Florida has passed a new stringent law to protect children from its effects. This law, Jessica's Law, is one of the toughest child molestation laws ever passed by a state legislature and has gained interest from other states, like California, which are drafting similar proposals. Jessica's Law requires a prison term of twenty-five years to life for those convicted of molesting a child under the age of twelve. The perpetual and chronic nature of this type of crime has generated a great deal of action and debate concerning the protection of our children. This paper reviews the current literature concerning child molestation from a criminal justice and a psychological viewpoint. It then follows key cases and legislation that lead up to the enactment of Jessica's Law.

DIFFERENCES IN GENDER FOR GROUP BEHAVIOR IN PUBLIC, April Colley, (Jan Case, Research Advisor), Jacksonville State University, MCIS Department, 700 Pelham Road North, Jacksonville, AL 36265

The purpose of this research was to consider the grouping behavior of adults at three public places: a mall, a cinema, and a restaurant. Data was collected through observation, and subjects were classified according to gender and the number of people in the group.

Hypothesis tests revealed the following. Composition of customers at malls, cinemas and restaurant is dependent upon gender. The proportion of female customers at the mall is significantly higher than the proportion of male customers. Furthermore, same gender groups at the mall are more likely to be female. However, lone shoppers are equally likely to be male or female. In other observations, males tend to travel in smaller groups than females, and in mixed gender groups, females tend to outnumber males. These behavioral patterns will be studied further to determine if differences exist among age groups, over different days of the week, or in urban vs. rural settings.

WRITING ACROSS THE CURRICULUM (WAC) IN CRIMINAL JUSTICE: IT'S A MYSTERY. Victor Ortloff, Department of Criminal Justice and Social Sciences, Troy University, Troy, Alabama 36082 and Saundra Casey, College of Enlisted Professional Military Education, Air University, Montgomery, Alabama 36114

Since its inception in the mid 1970's, Writing Across the Curriculum has found its way into most universities in the United States. The form and format of that program vary by institution and according to the teaching style of the instructor. This presentation describes one such approach used at Troy University initiated during the spring semester of 2005. The process began with a request to view a student's attempt at writing about a rape that she experienced six years prior and ended with the creation of a series of novels involving the active participation of a tenured member of Troy's faculty and six students.

A PRACTITIONER'S VIEW OF THE RELEVANCE OF A HOMELAND SECURITY DEGREE. Victor Ortloff, Department of Criminal Justice and Social Sciences, Troy University, Troy, Alabama 36082 and Saundra Casey, College of Enlisted Professional Military Education, Air University, Montgomery, Alabama 36114

There is no doubt the events of 9/11 triggered many changes in the way we, as a nation, view ourselves, especially as we discovered how vulnerable we were to attack. The response to this threat was multifaceted and included creating a new department within the executive branch called Homeland Security. This presentation explores two practitioner's views on the logic of establishing a degree in homeland security. The presentation reviews briefly, the background for the establishment of the new department and its apparent weaknesses as it faced recent "real world" natural disasters. The presentation flows naturally toward a discussion of the pros and cons of establishing an academic degree discipline to be offered nation wide to prospective college students.

POLICE OFFICER SAFETY AND THE 4TH AMENDMENT. Donald R. Brown, Department of Criminal Justice, Troy University, Troy, AL 36082. Cedric Hollis and Travis Guy, Troy, University, Troy, AL 36082.

The 4th Amendment of the United States Constitution's protection of privacy has proven to be the cornerstone of Democracy in America. Police officers risk death or injury each time they don their uniform and report for work. Safety is a constant concern and police must often make split second decisions under varying degrees of danger. The United States Supreme Court, in numerous case law decisions, has repeatedly determined that police officer safety is paramount and flexibility of 4th Amendment protections is needed. This presentation will address certain Supreme Court decisions that address 4th Amendment protections and concerns for officer safety while maintaining the integrity of civil liberties.

CELLULAR TELEPHONE USE BEHAVIOR, Richard A. Hudiburg and Psychology Undergraduate Research Team, Department of Psychology, University of North Alabama, Florence AL 35632

The current study, using in a sample of 117 undergraduate students, is an extension of a previous study that found interesting relationships between cell phone use behavior and several psychological measures. The current study was conducted because of substantial changes in cell phone service and the availability of new technology. In 2002, Hudiburg, Jefcoat, and Alred (2002) found that there was a limited available of cell phone service plans. The 2002 study found that differences in cell phone use behavior depended on having more "anytime minutes" which was usually limited to 300 minutes a month. In 2006, the number of "anytime minutes" in cell phone service plans has greatly increased and most plans have "rollover" of minutes. The current study focused more on the effects of cell phone use behavior on interpersonal behaviors. This study investigated the relationship of cell phone use behavior to self-esteem, self-monitoring, need for affiliation, and domains of personality. The current study supported the findings of the earlier 2002 study. Additionally, more extensive assessment of attitudes toward using a cell phone while operating a motor vehicle was investigated. Generally it was found that cell phone users perceive that using a cell phone while driving a car impairs ones ability to safely operate the car but the users still make and receive cell phone calls while driving a car.

HEALTH SCIENCES

RURAL AFRICAN AMERICAN WOMEN'S PERCEPTION OF EXERCISE. Carolyn Andrews, School of Nursing, Troy University, Troy, AL.

Purpose: The purpose of this study was to obtain information to describe African American women's perception of exercise. **Design:** This qualitative study, utilizing the focus group approach, was employed to uncover information related to African American women's perceptions of exercise. Two focus group sessions were conducted with 10 African American women. The sessions were conducted in two different fellowship halls in rural Alabama community churches. **Method:** Interview questions derived from the literature were used to guide the sessions. Demographic data were analyzed using descriptive analysis. The interview guide, copies of all transcripts, participant demographic information, and copies of all written field notes were used to facilitate content analysis of the qualitative data. **Findings:** An overriding pattern, "Improve Health", emerged from the data. Three themes, "Exercise is Work", "Feel Good", and "Lose Weight/Look Better", emerged out of this pattern. Descriptors of exercise, barriers, and motivators were also derived from the data. **Conclusions:** The participants provided definitions of exercise in terms of their personal perspectives. They also provided descriptors of what they considered to be motivators and barriers to their engaging in a regular exercise regimen.

CASTAWAYS: THE SELF-CONCEPT AND ROLE RELATIONSHIP ISSUES OF ADOLESCENTS WITH AN IMMOBILIZING CAST. Courtney L. Middleton, University of Alabama School of Nursing, Birmingham, AL 35294-1210

Self-concept and role relationships are instrumental parts of the growing adolescent's development. Self-concept is described by how individuals perceive themselves while role relationships are the everyday roles that we as humans fulfill. Adolescents strive to conquer both of these in order to gain acceptance and enhance their self-confidence. This study used a mixed method approach to look at adolescents in immobilizing casts to determine if being in the cast had any effect on their self-concept or role relationship issues. The Roy Adaptation Model (RAM) was used as part of the theoretical framework to determine how adolescents adapted in the physical, self-concept, role function, or interdependence modes. Participants were between the ages of 12-15 attending an orthopedic clinic for follow-up with a long-arm or long-leg cast. Approval for the study was obtained from the IRB and consent/assent was obtained from parents and teens. Participants completed a modified self-concept scale by Piers-Harris (1966), open-ended questions, a symptoms list, and a performance problems list. Questions were developed by the investigator and reviewed for content validity by nurse clinicians and researchers. Limitations to data collection included infrequent injuries occurring during the time of data collection and restricted clinic hours. Findings may suggest future practice interventions for nurses.

RURAL AFRICAN AMERICAN WOMEN'S PERCEPTION OF WEIGHT. Carolyn Andrews, School of Nursing, Troy University, Troy, AL.

Purpose: The purpose of this study was to obtain information to describe African American women's perception of weight. Design: A focus group approach was employed to uncover information related to African American women's weight perceptions in this qualitative study. Four focus group sessions were conducted with 15 African American women. The sessions were conducted in community church fellowship halls and a community center facility in rural Alabama. Method: Sessions were guided by use of interview questions derived from the literature. Descriptive analysis was performed on demographic data. Participant demographic information, copies of all transcripts, the interview guide, and copies of all written field notes were used to facilitate content analysis of the qualitative data. Findings: "Being Healthy" was the overriding pattern that emerged from the data. Four themes, "Feeling the Difference", "Setting Goals", "Comfort Zone", and "Exercise is Important", emerged out of this pattern. Descriptors of body weight and body size were also derived from the data. Conclusions: The participants provided definitions of weight in terms of their personal perspectives. They also provided descriptors of ideal body size, normal weight, overweight/obese, and underweight.

BABY STEPS TO MOTHERHOOD: THE EFFECT OF A SLEEP-IN ON MATERNAL ROLE ATTAINMENT IN MOTHERS OF PRETERM INFANTS. Sheri M. Lewis, Univ. of Ala School of Nursing, Univ. of Ala at Birmingham, Birmingham, Alabama 35294-1210

The birth of a premature infant requiring immediate medical attention in a Neonatal Intensive Care Unit (NICU) leads to maternal-infant separation and affects the mother's maternal role attainment. Before discharge of the infant, many hospitals implement a sleep-in to ease the transition home. This study evaluated the effect of the sleep-in on maternal role attainment, anxiety and confidence levels associated with caring for their preterm infant. These variables were assessed using the "Myself as Mother" Scale (Walker, 1982), the Pharis Self-Confidence Scale (Walker, 1982), and the state scale from the Spielberger State-Trait Anxiety Inventory (Spielberger, 1983). Scales were given before and after the sleep-in and values were compared using paired t-tests. Participants were mothers over 17 years old with infants born between 26 and 34 weeks gestation and who participated in a sleep-in prior to infant discharge. Preliminary results from two participants show a reduction in maternal anxiety, an increase in personal feelings of mothering, but a decrease in maternal self-confidence. A possible reason for this decrease in self-confidence is that the sleep-in changed the mothers' self-confidence from that of general confidence in caring for any child to a more specific level of confidence in caring for their own premature infant. Data collection will continue throughout the spring to insure an adequate number of participants. Extension of the study from a pilot to a unit-based study is planned to provide evaluative support for this nursing intervention.

THE FORGOTTEN GRIEVER: A QUALITATIVE ANALYSIS OF HOW TEACHERS DEAL WITH THE DEATH OF STUDENTS. Ramona Browder Lazenby, EdD, CRNP, Auburn Univ. Montgomery School of Nursing, Montgomery, AL 36124

In the year 2000, over 20,000 school age children died in the United States. If one-half of these children were attending school at the time of their death, over 10,000 classroom teachers had to deal with the loss. An extensive review of literature revealed a plethora of evidence that children needed, and were receiving, support when a classmate died. However, there was no evidence that the grief of the teacher had been acknowledged. The purpose of this qualitative research study was to examine how teachers deal with the death of a student during the school year. A phenomenological approach was used in an effort to gain an understanding of the phenomena. One-on-one interviews were conducted with thirteen teachers in the State of Alabama. Using Miles and Huberman's meta-matrix, the data was first analyzed using a within case analysis followed by a cross-case analysis. Results indicated that teachers do grieve when students die and that their faith and fellow teachers are the greatest source of support. Findings further indicated that teachers dealt with the death of a student by reaching out to the students and parents left behind. Implications for theory development, practice and research are discussed.

CHANGING HATS: HOW INTENSIVE CARE NURSES' CHANGE APPROACHES TO MEET DIVERSE PSYCHOSOCIAL NEEDS OF HEART TRANSPLANT PATIENTS Rebecca A. Fanguy, University of Alabama School of Nursing, University of Alabama at Birmingham, Birmingham, AL 35294-1210

Heart transplant patients experience a wide range of emotions and Heart Transplant Intensive Care Nurses deal with this range daily. The nurses must deal with all of these emotions themselves while at the same time helping these transplant patients cope with their own emotions. This qualitative study used a ten-item interview questionnaire was developed by the researcher to help identify approaches that these special nurses use. The interview questions were reviewed for content validity by researchers and nurse clinicians. The university IRB approved the study and nurses signed an informed consent to participate in the study and to have the interviews audio taped. All of the interviews were audio taped and transcribed.

Many of the themes stated by the nurses were common with almost every nurse interviewed. Nurses identified 15 different demeanors expressed by their patients including feeling powerless, grateful, overwhelmed, depressed, inspired, and motivated. Nurses enjoyed seeing the "happy" patient who was viewed as favorable while the "sad" patient produced in them frustration and stress. Strategies for dealing with the rapid transitions between patients included "taking a deep breath", "thinking about what to say", "gathering thoughts", and self-talk "we are going to have a good day today". Nurses identified a sense of reverence for their patients and strong peer-support within the unit to maintain their relationships with long-term patients.

Abstracts

PREGNANCY RATES IN 10-16 YEAR OLD FEMALES, AGE OF CONCEPTUAL MALES, AND RAPE CONVICTIONS: ALABAMA, JAN. 1997-DEC. 2001*; G. Bush, PhD, Dept. of Kinesiology, Troy U., Troy, Al., K. Swatzell, MPH, and R. Kirby, PhD, S. Pub Hlth, U.A.B. Birmingham. Al., T. Watkins RN, AIM Project, Troy, Al., E. Gordon, DO, MPH, Troy Reg. Med. Center, Troy, Al.

A descriptive epidemiologic study was conducted in the State of Alabama, to investigate pregnancy rates, age of conceptual males, rape/statutory rape indictments, and convictions in the study population. Alabama State Vital Statistics, medical, social, legal, law enforcement, laboratory and health insurance records were reviewed, as available. Appropriate agencies were contacted for information concerning legal protection and health care available to pregnant girls in this age range. We assessed the access to mandated legal protection and recommended prenatal care services among 10-16 year old girls, pregnant by older, unprosecuted males. Statistical analysis, including t-tests, correlation, and regression analysis were conducted. A disparity between pregnancies among 10-16 year old girls and the number of statutory rape convictions was observed. A clearer understanding of the epidemiology and legal protocols helped redefine the roles and requirements of health care providers, social workers, educators and law enforcement officials. Community and professional awareness developed through this project resulted in the creation of the Pike Regional Child Advocacy Center to provide integrated clinical, social and legal services. *Grant sponsored by ADPH, Perinatal Committee. Gordon, conceived/supervised the study; Kirby, Sr. research supervisor; Watkins, Grant coordinator; Swatzell, Intern; Bush, analysis/ editor.

CROSSREACTIVITY OF THE ANTI-CW REAGENT WITH RH ANTIGENS IN THE INDIRECT ANTIGLOBULIN TEST. Victoria D. Groves, Nicole Moore, Virginia C. Hughes, Division of Clinical Laboratory Sciences, Auburn University Montgomery, Montgomery, AL 36124.

Studies have shown there is amino acid homology between the Cw antigen and the c and C antigens of the Rh blood group. The anti-Cw reagent was tested against two different red cell phenotypes and against appropriate red cells for quality control. Group one tested anti-Cw against quality control red cells. Group two tested anti-Cw against red cells which were C-, c+, and Cw-. Group three tested anti-Cw against C+, c-, and Cw- red cells. Briefly, one drop of anti-Cw was added to a 2-5% suspension of respective red cells. The tube was centrifuged at 2800 rpm for 15 seconds and read for agglutination. If no agglutination was apparent, the tube was incubated at 37C for 15 minutes and centrifuged again. If no agglutination was apparent, the tube was washed with isotonic saline four times and 2 drops of anti-human globulin was added. The tube was centrifuged for 15 seconds and examined for agglutination macroscopically and microscopically. If no agglutination was apparent, 1 drop of Coombs check cells was added to the tube to validate negative indirect antiglobulin test results. All quality control results in group one were acceptable. In group two a total of 22 red cells were tested and only 1 cell or 4.5% showed a positive reaction. In group three a total of 23 red cells were tested and all reactions were negative. In conclusion, when testing patient or donor red cells for the Cw antigen it is necessary to examine reactions macroscopically and microscopically due to possible crossreactivity with the c antigen.

NEWBORN BEHAVIORAL OBSERVATIONS SYSTEM AS A NURSING INTERVENTION TO ENHANCE ENGAGEMENT IN FIRST-TIME MOTHERS: FEASIBILITY AND DESIRABILITY. Leslie Sanders, University of Alabama School of Nursing, Birmingham, AL 35294-1210

Engagement is the basic social process of maternal transition that enables maternal growth and transformation. Literature supports the use of interventions to enhance engagement by helping mothers understand and respond to the needs of their infants. The Newborn Behavioral Observations (NBO) system was developed in 2005 based on the work of T.B. Brazelton. The NBO is an exploration of the neurobehavioral characteristics of the newborn done with parents to increase their understanding of and ability to respond to the infant's cues. The purpose of this study was to determine the efficacy, desirability and feasibility of the NBO as a nursing intervention to enhance engagement, and to identify barriers in its use through interviews with mothers and nurses. The investigator obtained NBO training, developed questionnaires, and obtained IRB approval. Participants had positive perceptions of the NBO. Mothers (n = 10) rated the NBO high for its efficacy in helping them discover more about their infants increase their knowledge of their infants, and encourage discovery of their infants. Participants also rated the NBO high as an overall learning experience. Qualitative data revealed strong support for the NBO and its ability to enhance engagement activities as two of the components of engagement emerged as benefits of the sessions. Nurses (n = 19) in the study identified a need among their population for this type of intervention and believed the NBO would be effective in enhancing engagement and helping parents learn about their infants.

INCREASING AWARENESS: ASSESSING EXPECTANT FATHERS FOR PERCEPTIONS AND KNOWLEDGE OF POSTPARTUM DEPRESSION. Jeannie T. Laurance, Ellen Buckner, and Jill Ross, Univ. of Ala. School of Nursing, Univ. of Ala. at Birmingham, Birmingham, AL 35294-1210.

The phenomenon of postpartum depression (PPD) occurs in 10 to 20% of mothers, usually within the first three months after delivery. Postpartum depression has many detrimental effects, not only on the woman experiencing the illness, but also on her partner and infant. Early detection and treatment is vital to prevent long-term negative effects and to improve outcomes. Fathers will be among the first to witness the onset of postpartum depression and can be instrumental in contacting health care providers for appropriate interventions. A qualitative study conducted with expectant fathers (N = 38) in a prenatal education class was done to identify gaps in knowledge, current perceptions and misconceptions and specific questions that these fathers had regarding postpartum depression. Questions were designed by the investigator and reviewed for content validity by nurse clinicians working in obstetric care. Open-ended questions related to definitions of PPD, signs and symptoms, causes and explanations, and responses, plans for partner support following childbirth, and participant questions about PPD. The results point toward the importance of future efforts to increase awareness of PPD and knowledge of its recognition and management. It is vital to educate expectant fathers regarding the risk for postpartum depression in their partners, as well as to enable these fathers to identify signs and symptoms of postpartum depression.

KANGAROO CARE VERSUS TRADITIONAL METHODS FOR COMFORTING CRYING: MOTHERS' PERCEPTIONS. Leslie D. Noojin, Univ. of Ala. School of Nursing, Univ. of Ala. at Birmingham, Birmingham, AL 35233.

A simple technique, kangaroo care is a way of holding an infant wearing only a diaper, in skin-to-skin contact on the mother's bare chest. The purpose of this study was to examine the relationship between maternal-infant perceptions and the methods implemented to comfort crying infants, with a special emphasis being placed on the kangaroo care method. Participants included six women between 20 to 34 years old who were within 24 to 48 hours after vaginal delivery of their first child. The women who chose to participate were asked to complete the 12-item Broussard's Neonatal Perceptions Inventories and a 10-item investigator-designed questionnaire, the Perceptions of Crying Scale (PCS). The PCS was reviewed for content validity by nurse clinicians and researchers, and IRB approval was obtained for the study. Before hospital discharge the women were given questionnaires and provided with verbal and written education on techniques to calm a crying infant, including kangaroo care. After two weeks, participants received a posttest telephone interview at which time the questionnaires were completed and the participants were given an opportunity to voice their experiences with kangaroo care. Findings show that the study participants report statistically significant improved maternal-infant perceptions ($P < 0.05$). Participants also reported higher confidence in their ability to soothe infant cry. Participant's comments related to kangaroo care were all positive. Results support the belief that kangaroo care is a valuable comforting intervention.

IDENTIFICATION OF SPECIAL CARE NEEDS: THE COMPARISON OF THE CICU PATIENT AND NURSE. Brittany P. Godfrey, University of Alabama School of Nursing, University of Alabama at Birmingham, Birmingham, AL 35294-1210

Patients in the intensive care unit experience multiple stressors that may produce a special care need. Elevated noise levels, pain from procedures, limited visitation hours, and enforced immobility are only a few of the stressors that patients experience in the critical care setting, as identified by Dracup (1984). Consequently, with these stressors, did the patient develop any special care needs? By identifying the special care needs of patients, nurses can provide satisfactory and individualized care. Special care needs are defined in the study as needs of the patient that could have been met or addressed by the nurse. Thus, the purposes of this study are to assess (a) the critically ill patient's and critical care nurse's identification and perception of special care needs and (b) the relationship between the patient's and nurse's perception of the identified special care needs. A qualitative approach, using linked data and open-ended surveys, is used to identify common themes and patterns in data. Data collection took place over a one to two month period at a metropolitan research hospital in the Southeast on the 5th floor CICU and cardiac step-down unit. Common themes and patterns of identified special care needs were recognized across data and with linked data between the patient and nurse. Findings indicate that nurses and patients feel that special care needs of the patient are being met. Common needs currently identified by the patient include miscommunication, anxiety, pain and relaxation. Common needs currently identified by the nurses include pain management, nausea, and comfort.

EFFECTS OF OBJECTIVE AND SUBJECTIVE BREAST CANCER RISK, PSYCHOLOGICAL DISTRESS, AND DISPOSITIONAL OPTIMISM ON IMMUNE RESPONSE IN HEALTHY WOMEN. Na-Jin Park and Duck-Hee Kang, School of Nursing, Univ. of Ala., Birmingham, AL 35294.

The purposes of this study were to examine: (1) the effects of objective and subjective breast cancer risk and psychological distress (breast cancer-specific and general) on cytokine production (IFN- γ , IL-2, and IL-12); (2) the effects of objective and subjective risk on psychological distress; and (3) the moderating effect of dispositional optimism on the relationship between subjective risk and psychological distress. 117 healthy women (mean age=36.5) completed questionnaires for risk assessment, psychological distress, and dispositional optimism and gave a blood sample for immune measurements. Cytokines were determined by the ELISA. Objective breast cancer risk was assessed on the modified Gail model. Data were analyzed using multiple regressions. High objective risk significantly contributed to low IFN- γ ($\beta = -0.26$, $p < 0.01$) and IL-2 ($\beta = -0.24$, $p < 0.05$), but not to IL-12, controlling for subjective risk and distress. High subjective risk contributed to high distress, breast cancer-specific ($\beta = 0.30$, $p < 0.01$) and general ($\beta = 0.41$, $p < 0.001$), but not to cytokine production, controlling for objective risk. Dispositional optimism moderated the relationship of subjective risk with general distress, but not with breast cancer-specific distress. The findings indicate each type of risk has unique contribution: Objective breast cancer risk is more likely to affect immune response, whereas subjective risk is more likely to affect psychological distress. Further investigation is warranted in this area. This study was funded by the Department of Defense 2003 Breast Cancer Research Program.

THE EFFECTS OF FEAR ON MI PATIENTS IN FIRST 24-48 HOURS WITHIN ICU UNITS. Geraldine Allen, Dept. of Nursing, Troy University, Troy, Al 36081.

This was an exploratory descriptive study in which patients diagnosed with a myocardial infarction (MI) were interviewed within 24-48 hours of admission to a critical care unit. The purpose of this study was to describe the effect of fear on MI patients experiencing this phenomenon in the first hours of admission to an acute care setting. Fear is an emotion that is commonly described as being felt by MI patients. Literature review supports the premise that serious complications related to it could occur if there is ineffective coping and lack of support from the care provider and family. Thirty subjects who had experienced a MI for the first time agreed to be interviewed with a Fear Assessment Questionnaire. This semi-structured interview tool assessed the major sources of fear, physical symptoms experienced, and factors that help eliminate fears. The subjects ranged in ages from 37-87 years old and the MI was confirmed by EKG, physician note or laboratory report. There were 4 research questions: What are the major self-perceived fears of patients experiencing a MI within the first 24-48 hours of admissions to an acute care setting, What physical manifestations were experienced by MI patients in relation to their identified self-perceived fears, What did patients perceive as the events that provoked their fears, and What factors did patients perceive assisted in the resolution of their fears; Betty Neuman's Nursing System Model was used to guide the study. Content Analysis was used to analyze the data. The findings included the discovery of ten major fears, several physical manifestations, major common coping mechanisms and several resolution actions taken by subjects to eliminate their fears. Myocardial infarction mortality is now the number one cause of death among U.S. adult populations for both men and women. This study had implications on nursing practice, education and research.

SOCIAL SUPPORT AND REFRAMING OF ASPIRATIONS FOLLOWING UNPLANNED PREGNANCY AMONG SINGLE COLLEGE WOMEN Jamie S. Davis, University of Alabama School of Nursing, University of Alabama at Birmingham, Birmingham, Alabama, 35294-1210.

The purpose of this project was to discover how the aspirations of single, college age postpartum women were reframed in light of anticipated sources of social support. In the context of this study, aspirations are synonymous with hopes, dreams, and life goals. The Norbeck Social Support Questionnaire (NSSQ) was used as a quantitative measuring tool. Norbeck has conceptualized social support as primarily encompassing the three areas of affect, affirmation, and aid. To determine the women's reframing process, the researcher utilized a qualitative element in the form of an interview. Interview questions were designed by the investigator and reviewed for content validity by nurse researchers and clinicians. Approval for the study was obtained from the IRB. Interviews were audiotaped and transcriptions used to identify themes. Grounded theory was appropriate to this design because of the focus on social interactions. The six women who participated in the study reported strong support that enabled them to maintain forward momentum as they continue to reframe their lives and reach toward the aspiration of a degree in higher education. The preliminary results reveal themes of altered time frames, change in major, change in location, loss of free/fun time with peers, children as motivators, and the emotional journey leading to the destination of a significant milestone-a college degree.

SCAFFOLDING FOR EXPERIENTIAL LEARNING OF NURSING SKILLS. Michelle Schutt, School of Nursing, Auburn University Montgomery, Montgomery, AL 36117

Scaffolding is the deliberative process of providing verbal lecture, instructional tools, learning resources, and encouragement at the optimal stages of skill development in an effort to positively impact student learning. Skill development is comprised of three specific stages: Cognitive, associative and autonomous. Course design propels the student from the first stage of cognition to the final stage of autonomous action and responsibility for safe nursing skill performance by providing students with theory content using multiple methodologies to include lectures, demonstrations, reading assignments, CD skill review, video review, and web-based course support utilizing WebCT. Psychomotor skills including injections, nasogastric tube placement, and sterile technique to include catheterization and wound care, are developed through hands-on learning in a simulated acute care environment. A unique aspect of this course is the use of senior peer mentors to demonstrate skill performance and offer learning support during the initial practice of each skill. Peer mentors are also utilized to critique skill performance as students progress from imitation to manipulation. Vygotsky's sociocultural theory and theories concerning the development of procedural and conditional knowledge support the use of peer mentoring in this learning environment. Course faculty provides the final evaluation of student skill performance. Surveys of both student cohorts at mid-term and end of term revealed positive reaction to the senior peer mentoring approach to the development of nursing skills.

COMPARISON OF TWO DELIVERY MODELS FOR THE MEMORY AND HEALTHY AGING CENTER. Arlene Morris, AUM School of Nursing, Montgomery, AL 36124. Kathy Jo Ellison, Auburn University School of Nursing, Auburn, AL 36849.

The Memory and Healthy Aging Center (MHAC) was developed as a collaborative partnership between the schools of nursing at Auburn University and Auburn University Montgomery and East Alabama Medical Center to address these concerns in two Alabama counties. In the Lee County center services were delivered primarily via a stationery clinic site in the eldercare community. Services in the Montgomery County area were delivered via a traveling model to a geriatrician's office and to area nutrition centers. This poster will compare the first year of data from the two delivery models for services to determine what differences exist in demographics of clients served, in caregiver concerns and stress levels, and in interventions employed and outcomes achieved. Data were collected via an initial assessment and follow-up assessments at each visit. Notes were maintained on the duration of the visits and the interventions employed. Stress levels were assessed at the onset and following intervention. _MHAC saw 102 clients in year one with 40% being seen in the stationary site and 60% being seen in the mobile site. More caregivers were seen in the stationary site and more elders with early memory problems were seen in the mobile site, however, both caregivers and recipients tended to be older in the mobile site. Although caregivers at the stationary site were significantly more stressed at the start of MHAC intervention, no differences existed by site following intervention.

MEMORY AND HEALTHY AGING CENTER OUTCOMES IN DIVERSE POPULATIONS. Arlene Morris, AUM School of Nursing, Montgomery, AL 36124. Kathy Jo Ellison, Auburn University School of Nursing, Auburn, AL 36849.

This paper will describe the involvement, perceived difficulty and preparation for caregiving for persons with memory problems attending a memory and healthy aging center and discuss the results of an individualized educational support program. A pre-post survey approach was utilized with those attending a memory and healthy aging center operating in two cities in Alabama. Questionnaire data were collected regarding caregiver involvement with physical care, behavioral and psychological symptoms of memory problems as well as life changes that have been made. Caregivers were asked to rate their perceived difficulty with providing the care and preparation for making the changes needed both pre and post the intervention program. Sixty-five people participated varying from those providing care early in the course of a memory problem and looking for something to delay the progress of the disease to those proving a high degree of physical and mental care and nearing burnout. Over 90% of the participants had one or more areas where perceived difficulty was high. Results demonstrated the MHAC interventions significantly reduced the stress level of the caregivers who attended the program ($p < .001$) and increased the caregiver knowledge level in 95% of the clients and perception of preparedness for caregiving in 83% of the clients. Implications for education and support of caregivers of those with memory problems and recommendations for future research to improve caregiving outcomes will be addressed.

SINGLE NUCLEOTIDE POLYMORPHISMS ARE ASSOCIATED WITH AGGRESSIVENESS OF COLON CANCER IN AFRICAN-AMERICAN PATIENTS. RAHUL R.GOLI. THE ALTAMONT SCHOOL. Dr. Upender Manne, assistant professor of the Department of Pathology and Human Genetics at UAB, Drs. Venkat Katkoori, Tom Callens, Ludwine Messiaen, and William Grizzle

Background: We reported an increased incidence of mortality for African-Americans with high-grade colonic adenocarcinomas (CACs) when compared to Caucasians. To understand the molecular basis for this disparity, we assessed the mutational patterns of the p53 gene and microsatellite instability (MSI) in high-grade CACs of African-American and Caucasian patients and correlated these results with their survival.

Materials and Methods: The DNA samples were isolated from high-grade CACs and matching control tissues collected from 27 African-American and 32 Caucasian patients. The status of the p53 gene was assessed by direct sequencing of the entire coding region. Polymerase chain reaction amplifications were performed with 5-oligonucleotide primer sets to assess the MSI status of 5 specific loci. Chi-square analysis and univariate Kaplan-Meier survival analyses were used to assess the prognostic significance of molecular alterations.

Results: Similar proportions of high-grade CACs from African-American and Caucasian patients have exhibited MSI (37% versus 41%) and missense point mutations at hotspot codons of the p53 gene (11% versus 16%). However, single nucleotide polymorphic mutations at codon 72 were more frequent in African-Americans (33%) than in Caucasians (9%). African-Americans with SNPs at codon 72 which exhibit the phenotypes, Proline/Proline (33%) or Arginine/Proline (37%) had higher mortality than those with the phenotype Arginine/Arginine (30%), such a difference in mortality was not observed in Caucasian patients .

Conclusions: These preliminary findings suggest that the SNP pattern at codon 72 of the p53 gene differs in high-grade CRCs collected from African-American and Caucasian patients; specifically, the phenotypes Arg/Pro or Pro/Pro of p53 are associated with poor clinical outcome of African-American patients.

ENGINEERING AND COMPUTER SCIENCE

AN AUTOMATED SEGMENTATION METHOD FOR MICROARRAY IMAGE ANALYSIS. Wei-Bang Chen and Chengcui Zhang, Dept. of Computer and Information Sciences, University of Alabama at Birmingham, AL 35294. Wen-Lin Liu, Dept. of Management, Marketing, and Industrial Distribution, University of Alabama at Birmingham, AL 35294

Biologists use microarray to detect gene expression level in parallel for understanding the relationship of genes. Gridding and spot segmentation are two critical steps in microarray gene expression data analysis. However, the problems of noise contamination and donut-shaped spots often make signal extraction process a labor-intensive task. In this study, we propose a three-step approach for automatic gridding and spot segmentation. The approach starts with a background removal and noise eliminating step. The background removal process uses a local-global thresholding technique to pre-label and identify pixels that are most likely background pixels and then remove them from the foreground. The noise eliminating process uses a voting method based on spatial connectivity to eliminate the majority of noise. The second step applies a fully unsupervised method to extract blocks and grids from the pre-labeled and cleaned data. The third step applies a simple, progressive spot segmentation method to deal with inner holes and noise in spots. We tested its performance on real microarray images against widely used software GenePix. Our results show that the proposed method deals effectively with poor conditioned microarray images in both gridding and spot segmentation.

A SIMPLE MACHINE PROOF OF EULER'S FORMULA. Jun Zhang. Dept. of Math & CS, Troy University, Troy, AL 36082

We are living in an information age, such that everything is digitalized. The encoding of functions and the automatic proof of functions are very important in both theories and applications. This paper will discuss a simple method of calculation for Taylor expansion coefficients, which can be easily implemented in a computer algebra system like Maple. As an example, it can be applied to prove Euler's formula automatically.

NEEDS ASSESSMENT FOR SCIENTIFIC VISUALIZATION OF MULTIVARIATE, HIGH-DIMENSIONAL MICROARRAY DATA. Vetria L. Byrd, Department of Computer and Information Sciences, Univ. of Ala., Birmingham, Birmingham, AL 35294. Tarynn M. Witten, Center for the Study of Biological Complexity, Virginia Commonwealth Univ., Richmond, VA 232840.

Microarrays are a high throughput technology that allows for the analysis of hundreds to thousands of genes simultaneously. We hypothesized there is an unmet need for more advanced visualization tools that are not currently available. A survey research instrument was designed, and administered from two universities. The protocol was approved by the Institutional Review Boards at Virginia Commonwealth University, and The University of Alabama at Birmingham. Participants were chosen from life and biomedical/health scientists, research institutes, biotech companies and other researchers who do microarray data analysis. Participation in the survey was voluntary. Basic non-identifiable demographics were requested. The survey was designed to ascertain from participants what microarray technologies, microarray tools as well as what graphical methods are commonly used for representing microarray data. Responses from the survey indicated there is a need for an integrative visualization tool for microarray analysis. Respondents indicated they were not satisfied with the ability of the current software tools to visualize their data; however, they are unable to describe new tools and features that could assist them. This suggests that a more comprehensive, thorough study should be implemented and structured to reach a more extensive microarray user base. Responses from this research effort identified a number of open problems that remain to be addressed in the microarray process. Support of this project was funded through grant EEC0234104 from NSF/NIH Bioinformatics and Bioengineering Summer Institute Program at the Virginia Commonwealth University, Center for the Study of Biological. IRB approval: UAB (#X050822007), VCU (#5065).

CLONE DETECTION WITH MICROSOFT PHOENIX. Robert Tairas, Department of Computer and Information Sciences, University of Alabama at Birmingham, Birmingham, AL 35294.

A code clone represents a sequence of statements that are duplicated in multiple locations of a program. Clones often arise in source code as a result of multiple cut/paste operations on the source, or due to the emergence of crosscutting concerns. Programs containing code clones can yield problems, especially during the maintenance phase. When an update is needed on the original copy of a code section, all clones of that code section must also be found so that they can be updated accordingly. If done manually, the detection of clones can be a slow and tedious activity that is also error prone. A tool that can automatically detect clones offers a significant advantage during software evolution. With such a tool, clones can be found and updated in less time. Moreover, these clones can be considered for restructuring or refactoring, which could yield better performance and modularity in the program.

This presentation will describe an investigation into an automatic clone detection technique that finds function level clones in a program. Microsoft's new Phoenix framework is used to host the clone detection process. Our process of detecting clones utilizes abstract syntax trees and suffix trees. The nodes of an abstract syntax tree are used to generate a suffix tree and we use the same methods on the suffix tree that have been successfully applied to biological sequence matching to search for duplicate sections of code.

ANTHROPOLOGY

PROBLEMS AND SOLUTIONS FOR DIGITAL PHOTOGRAPHY IN ARCHAEOLOGY. Sean Williamon, Archaeological Resource Laboratory, Jacksonville State University, Jacksonville, AL 36205.

Cameras and other digital imaging devices, such as scanners, afford archaeologists the opportunity to present artifacts and other cultural items to the public or to other scientists, with some level of ease. Digital images utilized in technical reports or presentations must maintain a high level of accuracy. To ensure a scientific-quality product, one must possess the ability to accurately manage color, brightness and contrast, as well as perspective. This paper will address these issues by presenting a basic methodology that can be followed by any archaeologist/photographer to achieve accurate, efficient, and consistent results. Basic points of interest will include: 1) creating a basic digital darkroom, 2) methods of color management, and 3) achieving a professionally finished product.

A PRELIMINARY ANALYSIS OF THE TERRY COVE SITE, 1BA468.
Rebecca Turley Ridley, Archaeological Resource Laboratory, Jacksonville
State University, Jacksonville, AL 36205.

To date, there have been at least five separate investigations at the Terry Cove site, which stretches across three separate parcels of land. The Pensacola Archaeology Laboratory performed Phase I, Phase II, and Phase III investigations in the Walker Key portion of the site. The JSU-ARL performed Phase I testing and a Salvage investigation at the Grander portion of the site, and Jerry Neilson performed a Phase I investigation of that portion situated on the Trent Marina property. These investigations have yielded temporally diagnostic artifacts, an intact midden, and two midden mounds that are consistent with a Santa Rosa-Swift Creek occupation.

While many questions regarding the Santa Rosa-Swift Creek culture remain unanswered, the current study focuses on four main areas: 1) the exploitation of faunal materials with respect to both subsistence and tool use, 2) the exploitation of botanical materials by the Santa Rosa-Swift Creek culture, 3) refining the current ceramic chronology, and 4) establishing the basic material culture of the Santa Rosa-Swift Creek in northwestern Florida and coastal Alabama (at least as it applies to midden sites with mounds). Since our study is ongoing, this paper will present our preliminary findings as we endeavor to compile existing data into a comprehensive and meaningful interpretation of Santa Rosa-Swift Creek as it is manifested at the Terry Cove site.

ANALYSIS OF THE FAUNAL REMAINS FROM THE CENTRAL AREA
EXCAVATION OF HACIMUSALAR HOYUK. Jefferson Keith, Dept. of Biology,
BSC, Birmingham, AL 35254. Jeannette Runquist and Andrew Sims.

The Central area is a stratified deposit with the earliest occupation dating to the 8th -7th century B.C. The mid 4th century B.C deposits represent a transition period between the earlier industrial activity and the construction and use of a large ceremonial building which remained in use as late as the 8th century A.D. The industrial period is marked by low species diversity and a very strong reliance on the four domesticates. The analysis of MNI counts associated with particular cuts of meat indicated that the inhabitants used all cuts of meat. The mid-4th century is clearly a transition period. Animal diversity increased in this period and a trend towards a preference for cuts of meat from the head region and the secondary cuts becomes evident. After the 4th century B.C., the economy seemed to go through a series of boom and bust cycles. This change over time is reflected in the percentage of MNI. In the earliest phases, cows comprised 22.2%, sheep and goat comprised 66.6% and pig comprised 11.1% of the total MNI for the period. In the middle phase, cows comprised 25.0%, sheep/goat 52.7% and pig 22.2% of the total MNI. In the period following the 4th century, cows comprised 8.0%, sheep/goat 75.0%, and pig comprised 17.0% of the total MNI for the period.

ANALYSIS OF THE FAUNAL REMAINS FROM THE WEST SLOPE OF HACIMUSALAR HOYUK IN SOUTHWESTERN TURKEY. Jordan Duchock, Dept of Biol., BSC, Birmingham, AL, 35254. Trey Prickett, and Jeannette Runquist.

The 3,124 animal bones from the West Slope of Hacimusalar Hoyuk yielded insight into the dietary habits of inhabitants from the Early Bronze Age (EBA II) through modern times. Excavation revealed that the EBA II deposit was a habitation area containing the remains of a number of small dwellings. The faunal remains from that community exhibited the highest species diversity and the greatest abundance of wild animals suggesting that while these residents were sedentary, they were still reliant on the capture of wild game to supplement their diet of domesticated animals. The 8th -7th B.C. century fill of an early City Wall yielded faunal remains more similar to that found among the modern residents of the area. The remains suggest that the economy during this transition period was at its strongest since remains of cows and pigs were more abundant than in either the EBA II deposit or the modern deposit. The remains from the modern period were almost entirely of the four domesticates and sheep and goat remains totally dominated those from cows and pigs. Where sheep and goats could be distinguished, the animals were present in a 1:1 ratio. The residents utilized all parts of the animals although they preferred meat from the primary cuts.

ANALYSIS OF THE FAUNAL REMAINS FROM THE NORTH SLOPE OF HACIMUSALAR HOYUK. Jacob Bivona, Dept of Biology, BSC, Birmingham, AL 35254. Meg Guscette, Jeannette Runquist, and Terri Young.

Analysis of the 8,800 bones found in the North Slope excavation yielded insight into the nature of subsistence from the Early Bronze Age to Middle/Late Roman times. Historical records and analysis of the bones show that a portion of the site was a dump. Different conditions between the Early Bronze Age communities and those that followed them temporally were noted. The very high species diversity and the abundance of wild animals suggest Bronze Age communities relied in part on hunting and gathering, possibly representing a transition phase between hunter-gatherers and farmers/domesticators. The peak economic conditions seem to have occurred in the 8th and 7th centuries B.C. During this time, the relative abundance of cattle, an expensive livestock to maintain, was at its highest and species diversity was at its lowest. Throughout the different ages, the predominant livestock animals were sheep and goat. Cattle were present at lower frequencies, and pig still lower. Cow and sheep/goat contributed roughly equal quantities of meat to the diet, and pig contributed significantly less. The North Slope communities preferred the tastiest primary cuts of meat, as shown by both cut marks found on bones and by the differential recovery of bones associated with specific cuts of meat.

ANALYSIS OF THE FAUNAL REMAINS FROM FIVE EXCAVATION AREAS OF HACIMUSALAR HOYUK IN SOUTHWESTERN TURKEY. Jacob Bivona, Dept. of Biol., BSC, Birmingham, AL 35254. Heather Glover, Jeannette Runquist,, and Meg Guscette.

The excavation of the five areas of Hacimusalar provided a glimpse of the changes in the subsistence pattern that occurred between EBA II and the modern period. While the four domesticates dominated the remains in all time periods, the remains of wild animals constituted about 15% of the total faunal deposit in the EBA II deposits compared to less than 5% in the other time periods. These data suggest that while the EBA II inhabitants were sedentary, they retained a reliance on wild game to supplement their diet. The 8th-7th century B.C. deposits of city walls and other fortifications suggest that this period was the strongest economically. During this time, cow and pig accounted for a substantial number of the domesticated remains and the available meat yield, species diversity had declined, and sheep/goats were approximately equally represented. The various deposits dating between the 8th-7th century B.C. and the modern period show cyclical changes in faunal remains suggesting that the economy underwent periodic declines and revivals. Very few non-mammalian remains were recovered despite the availability of a river within 3 km of the site and the presence of a major flyway for migratory birds.

ANALYSIS OF THE FAUNAL REMAINS FROM THE EAST SLOPE EXCAVATION AT HACIMUSALAR, TURKEY. Clay Foster, Dept of Biology, BSC, Birmingham, AL 35254. Jeannette Runquist.

The excavation of the East Slope of Hacimusalar Hoyuk located in southwestern Turkey yielded 563 bone fragments of which 15% were identifiable to genus. These fragments represented the remains of seven species of animals including sheep, goat, cow, pig, horse, rabbit, and rodent. In a subjective analysis of the degree of fire/heat exposure, 48% of the fragments exhibited no evidence or light exposure to fire or heat, 32% were moderately burnt, and 20% were burnt black or chalky. Remains of small (rabbit and rodent) and large mammals (cow, pig, horse) overwhelmingly showed no or light exposure to fire (73-75%) compared to only 21 % of the medium-sized mammals. In contrast, only 6-8% of the small and large animal remains were burnt black or chalky compared to 21% of the medium-sized mammals. These data suggest that cooking methods varied according to the size of the animal. As one might expect, long bone fragments dominated the remains of unidentified specimens. Among the identified fragments, the four food domesticates (sheep, goat, cow, and pig) dominated the remains whether determined by number of individual specimens or minimum number of individuals. Goats similarly outnumbered sheep by a margin of 3.5:1. The absence of any wild animals (except rabbit and rodent) and the relative abundance of cows and goats suggest a strong economy based predominately on domesticated food animals. Analysis of the identified remains from the domesticates indicate that all parts of the animals were being utilized.

VARIATION IN THE ENGLISH TENSE/ASPECT SYSTEM AS AN INDEX OF SPEAKER ATTITUDE: A CORPUS-BASED LINGUISTIC ANALYSIS OF ACADEMIC WRITING. Catherine Smith, Dept. of English, Troy University, Troy, AL 36082.

The English verb phrase has two tenses (past, nonpast) and three aspects (simple, perfect, progressive) which comprise the tense/aspect system. Lay knowledge of tense/aspect functions includes expressing the *time*, *relevance* or *duration* of an event or situation. Tense/aspect actually express a much wider range of language functions, including four categories of speaker attitude (*certainty*, *good/bad*, *importance*, *transparency*). Corpus Linguistics research methods allow analysis of large data sets (corpora) to describe lexical and syntactic patterns across different registers (*e.g.*, conversation, academic writing). Such methods can predict the presence of different tense/aspect functions in texts by identifying collocation patterns of key linguistic forms (*e.g.*, verb type, subject type, clause type). The patterns are empirically tested and functionally interpreted. Results allow linguists to index registers in terms of both linguistic forms and language functions. When this protocol is applied to professional academic writing (traditionally viewed as an objective register), the tense/aspect system unexpectedly manifests all four categories of speaker attitude (also called subjectivity). Results suggest that subjectivity plays an important role in specific rhetorical contexts in academic writing, which include expressing: a) certainty of concepts/observations, b) goodness/badness of procedures/thought processes, c) importance of concepts/researcher actions, and d) transparency of researcher assumptions.

FAUNAL REMAINS FROM THE BYZANTINE CATHEDRAL AT HACIMUSALAR HOYUK IN SOUTHWESTERN TURKEY. Heather Glover, Dept of Biol., BSC, Birmingham AL 35254. Jeannette Runquist.

Excavation of the Byzantine Church yielded 3,180 bones of which 55% showed no evidence of fire/heat exposure. Domesticated animals dominated the material whether determined by bone count, MNI, or meat yield. Cow and pig were far less abundant than sheep and goats and where sheep and goat could be distinguished, the two animals were present in a ratio of 1:1. Most striking about the faunal remains from the area was the relatively large number of remains from birds and rodents. The sturdy construction of the building would have provided these animals nesting areas long after the building was abandoned. While the species diversity of the area was similar to that from the other deposits at Hacimusalar (with the above mentioned exception), the large percentage of bones that exhibited no evidence of fire /heat exposure is strikingly different and raises the possibility that these animals were somehow prepared differently for their use in religious ceremonies.

BIOETHICS AND HISTORY & PHILOSOPHY OF SCIENCE

SCIENCE AND THE UNDERSTANDING OF CONSCIOUSNESS, Gerard Elfstrom,
Department of Philosophy, Auburn University, Auburn, AL, 36849-5210

The scientific study of the relation between brain states and states of consciousness has come alive in the past several decades. Researchers, such as Christof Koch, are confident they will soon be able to track the entire set of links which lead from brain states to states of consciousness and derive theories to account for the relation. However, several critics are convinced that this project can never succeed because states of consciousness seem radically different from physical states. They present a number of arguments to support their contention. I will examine and evaluate these arguments. I will conclude that these arguments fail to demonstrate that the scientific project must fail and that the scientific study of consciousness has not as yet progressed to the stage where these matters can be settled.

SOCIAL GOALS OF SCIENCE LITERACY: ETHICS AND CITIZENSHIP
IN PROJECT 2061. Michelle Sidler and Natasha Jones, Auburn University, Dept. of
English, 9030 Haley Center, Auburn Univ., AL 36849.

In the mid-1980's, in reaction to growing concerns about the decline of American science education, Project 2061, sponsored by the American Association for the Advancement of Science (AAAS) began with the aim of promoting science literacy in primary and secondary schools. Project 2061's organizers advocate and endorse "science literacy" and "science for all Americans," by recognizing the changing needs of American citizens, both those who pursue scientific careers and general citizens. The mission of Project 2061, in fact, ties science education directly to citizenry in a responsible, ethical society. Although Project 2061 has made some strides towards better scientific education, the gap between the scientifically literate and citizens suffering from "scientific deprivation" continues to widen. Many Americans, largely due to race and socioeconomic class, do not have access to the basic science knowledge that is necessary for them to successfully function in society. As our world becomes saturated with science, these disadvantaged groups will be limited politically, socially, and economically, ultimately becoming entrapped in an unending cycle of dependence and vulnerability.

BENEFITS OF GIS IN CULTURAL RESOURCE MANAGEMENT.
Jacob Kohute, Archaeological Resource Laboratory, Jacksonville State University, Jacksonville, AL 36205

A GIS, or Geographic Information System, can provide a wide range of services in a diverse collection of disciplines. The complex and time extensive tasks involved in surveying and data compilation within the field of Cultural Resource Management can be greatly aided by the proper use of a Geographic Information System. Before field tasks are implemented, topographic and situational data can be compiled to prepare for upcoming projects. With the use of spatial and statistical information a GIS can provide an assessment of the area as it relates to historical site encounter probability and general location dynamics. Data compiled during field analysis then can be managed within the Relational Database Management System, the analytical powerhouse behind a GIS. Subsequently, this data can be analyzed statistically and spatially to better understand a particular site's attributes and to discover underlying trends and relations within the site and among other areas. This analysis can lead to improved reports, along with reduced time required for mapping and sharing survey information among concerned parties.

EVOLUTION, INTELLIGENT DESIGN, AND THE DEMARCATION PROBLEM. Keith Gibson, Dept. of English, Auburn University, AL 36849.

The current debate over intelligent design in school curricula around the country is important for the education of America's children; it is also very interesting rhetorically. One of the tactics employed by both sides has been to define science in a particular way: biologists want to restrict science to exclude intelligent design; ID proponents want to expand science to include much broader applications of "theory." In my talk, I will examine three aspects of the demarcation problem as it relates to the evolution-intelligent design debate. First, I will apply Aristotle's work on arguments from probability to biologists' attempts to engage students who have been taught to be hostile to their subject. Next, I will address the misplaced focus on the "origins of life" as an appropriate topic for biology. Finally, I will analyze the walling-off biologists are attempting as they claim that anything not strictly biological has no place in a science classroom. My analysis leads me to believe that there is less conflict than is commonly portrayed, and I believe a close rhetorical examination can help combat those who insist that this is a fight worthy of a Supreme Court case.

EVIDENCE OF PREHISTORIC HOMICIDE: MURDER OR EUTHANASIA? M. Cassandra Hill, Ph.D., Archaeological Resource Laboratory, Jacksonville State University McClellan Center, Anniston, AL 36205.

As a consequence of the widening of Highway 463 in Arkansas, four sites required archaeological Phase III mitigation. Two of the four sites, 3CT340 and 3CT341, had prehistoric human burials. Feature 1 from site 3CT340 is the topic of this presentation. In the field, this burial appeared to be typical for the transitional Woodland/early Mississippian period. However, during the laboratory analysis it became clear that this young woman had evidence of perimortem cranial trauma. Information provided by the other specialists on the project suggests that there may have been reasons for this sudden end to her life.

DENYING DARWIN: A RISKY "TRAINED INCAPACITY." James T. Bradley, Dept. of Biological Sciences, Auburn University, AL 36849.

Early 20th C economic and higher education theorist, Thorstein Veblen, is credited with coining the uncommonly heard term "trained incapacity" to refer to education at American business schools that produces a "widening in the candidate's field of ignorance while it intensifies his effectiveness within his specialty." Sociologist Troy Duster recently applied Veblen's term to modern bioethicists' apparent incapacity to see the hidden eugenic potential in germ-line interventions (In: *Designing Our Descendants*, A.R. Chapman and M.S. Frankel, eds., 2003). "Trained incapacity" also aptly describes America's ignorance about the principles of Darwinian evolution and their relevance in 21st C science and society in areas including medicine, environmental quality, the future of religion, and the future of human nature itself. Denying the reality of Darwinian evolution, either actively or passively, risks great harm to ourselves and our descendants.

Alabama Academy of Science Symposium, 2006
“Southeastern Society for Environmental Toxicology and Chemistry”
Annual Meeting, Troy University

THE EVALUATION OF CRYO-PROTECTION ON EMBRYOS OF *XENOPUS* LARVA. Marie Pierre-Louis, J.S.U., Jacksonville, AL 36265. Dr. Cline, Dept of Biology, J.S.U., Jacksonville, AL 36265.

The use of cryo-preserving embryos of Amphibians could be useful in toxic testing. This research focused on the evaluation of cryo-protection on *Xenopus* embryos. Five solutions (2 different kinds of ethylene glycol, Galactose, DMSO, and PVP) were used as cryo-protection. Twenty embryos were used for each treatment. For each treatment, embryos were placed in a Petri dish containing 8ml of the cryo-protection solution plus one control solution for 5 minutes. . Twenty embryos were placed into 8M of ethylene glycol than replaced into 2M of ethylene glycol. The same amount of embryos was placed into galactose, DMSO and PVP. Then the embryos were placed into plastic straws capped with parafin. Those straws were then placed in a -20°C freezer until thaw. After 3 days, the embryos were unfrozen by swirling them gently into a water bath for about one minute. They were then placed into a Petri dish containing control solution, and observed. Embryos in the DMSO, galactose, and ethylene glycol lysed. For the PVP, nineteen of those embryos were recognizable but had some deformation. Thirty minutes later, the eggs started to reshape. Some cells were alive but not the embryos. The PVP was seen to be the best cryo-protection but more tests including toxicity testing need to be done. This experiment was supported by the Alabama Academy of Science research award.

ANALYSIS OF ALKYLPHENOLS IN WASTEWATER USING SOLID-PHASE EXTRACTION AND GAS CHROMATOGRAPHY/MASS SPECTROMETRY. Yassin A. Jeilani, Bianca M. Coley and Victor M. Ibeanusi, Spelman College, Environmental Science and Studies, Atlanta, GA 30314.

Interest in the health effects associated with alkylphenols has made the analysis in environmental matrices a priority. Solid-Phase Extraction (SPE) method was developed for the extraction of selected alkylphenols in wastewater followed by derivatization and analysis by gas chromatography/mass spectrometry in single ion monitoring mode. The analytical method was used in the analysis of influent and effluent samples collected from a local wastewater treatment plant. The effect of sample pH, SPE sorbent and sample volume used in the extraction were compared in terms of recovery data.

PHYTOTOXICITY OF MONOMERIC AND POLYMERIC ALUMINUM TO NATIVE WETLAND PLANT SPECIES. Ivan Stefanov and Marina Koether, Department of Chemistry and Biochemistry, Kennesaw State University, Kennesaw, GA 30144. Heather Sutton, Department of Biological and Physical Sciences, Kennesaw State University, Kennesaw, GA 30144.

The most commonly used coagulant for the treatment of drinking water is aluminum sulfate (alum). The aluminum (Al) species in alum is the monomeric species Al^{3+} ($\text{Al}(\text{H}_2\text{O})_6^{3+}$). However, polymeric Al coagulants such as polyaluminum chloride used to treat drinking water may contain up to 10% of the Al as the polymeric species, Al_{13}^{7+} ($[\text{AlO}_4\text{Al}_{12}(\text{OH})_{24}(\text{H}_2\text{O})_{12}]^{7+}$). These Al species can enter the environment through the land farming of the aluminum hydroxide sludge produced during the sedimentation process in the treatment of drinking water. Aluminum in this sludge can then enter waterways and wetlands through leaching or runoff. The toxicity of Al_{13}^{7+} in the environment relative to Al^{3+} is in question. The goal of this study was to investigate the relative toxicity to wetland plants of Al_{13}^{7+} as compared to Al^{3+} . Native wetland plant species tested were swamp milkweed (*Asclepias incarnata*) and saw-tooth sunflower (*Helianthus grosseserratus*). Additionally, radish (*Raphanus sativus*) was tested, as it is an agricultural species commonly used as a surrogate in place of native plants. Concentrations ranging from 0 to 500mg/L were evaluated. Endpoints measured were shoot and root length and mass, as well as internal plant concentrations of aluminum and various nutrients. Despite high variability in the data, a number of patterns emerged. Radish showed more differences in response between the two aluminum species than the native plant species did. With some of the internal plant aluminum or nutrient concentrations, the two aluminum species caused a different pattern of response.

MOLECULAR ANALYSES OF THE EFFECTS OF PERCHLORATE CONTAMINATION TO ARABIDOPSIS, SORGHUM, AND TOBACCO PLANTS. Mijitaba Hamissou and Ray Dunkerley. Jacksonville State University, Jacksonville, AL 36265

Perchlorate is a highly water soluble anion that moves through ground and surface waters, accumulating rapidly in the environment. It is used as an oxidizer in solid propellants, ballistics, in rocket and missile fuels, fireworks, munitions. Lakes and underground waters near rocket-assembly plants and military bases were shown to have high level of perchlorate. When released into the environment, perchlorate becomes an environmental pollutant posing immunotoxic conditions in animals and possibly in plants. The toxic effects of most pollutants are believed to be exerted on key metabolic enzymes, on photosynthetic apparatus, on growth, yield and quality. The objectives of this research are to determine the effects of perchlorate contamination on the plants' photosynthetic abilities and to investigate the involvement of perchlorate in oxidative stress induction in *Arabidopsis thaliana*, *sorghum bicolor*, and *Nicotiana tobaccum*. Plants were grown and maintained in potted soil in a growth chamber and then screened for toxicological responses when challenged with perchlorate solutions. Chloroplasts were isolated by differential centrifugation and assayed for the light reactions of photosynthesis. Isolated cytoplasmic proteins and chloroplasts were assayed for SOD activities. Plant growth, biomass accumulation were also recorded. The data showed that sorghum and tobacco responded to perchlorate by shifting to underground growth. Higher SOD activities and reduced NADPH₂ were also recorded in perchlorate treatments.

CONTAMINATED WATERSHEDS NEAR THE ANNISTON, AL. MONSANTO SITE EXAMINED BY USE OF THE FETAX ASSAY AND DEVELOPMENT OF ADDITIONAL DEVELOPMENTAL TOXICITY ASSAYS. Roger Sauterer, Dept. Of Biology, Jacksonville State University, Jacksonville, AL 36265

Waters and soils in Anniston, AL are contaminated by PCB-laden runoff from landfills at the local Monsanto plant. Despite clean-up efforts, soils, waters and the blood of local residents still have elevated levels of PCBs. In order to assess the effects of current PCB contamination on aquatic organisms, we are analyzing the development of the frog *Xenopus laevis* when exposed to control solutions, waters and aqueous sediment extracts from streams near the Monsanto site using both the standard Frog Embryo Teratogenesis Assay – *Xenopus* (FETAX) and extended incubations of frog embryos in control solutions and test samples. The standard FETAX assay shows subtle but significant growth inhibition in embryos exposed to contaminated waters and sediment extracts, though mortality and malformation rates are not affected. Because anuran embryos are relatively insensitive to the effects of PCBs and dioxins during the first five days of development and become more sensitive later, we are developing an extended modification of the FETAX assay where embryos are exposed to samples for two weeks or more. Preliminary results indicate embryos raised in contaminated Snow Creek water for 24 days show significant growth inhibition compared to the controls. We are continuing extended incubation assays over the first 2-4 weeks of development and are plan to develop a similar assay using zebrafish as a new model organism.

GERONTOGENE EFFECTS ON THE RESISTANCE OF NEMATODES TO HYDROGEN PEROXIDE OR NICKEL TOXICITY. Jeffrey Zuiderveen, Joanne Brown, Dept. of Biology, Columbus State Univ., Columbus, GA 31804 and Aisha Kelly, Ga. Perimeter College, Conyers, GA 30012.

Gerontogenes are genes that, when mutated, cause an increase in the lifespan of the organisms beyond that of the wild-type. Several of these genes have been identified in the nematode *Caenorhabditis elegans*. Among these are the *clk-1* and the *daf-2* mutations. Although they affect separate pathways, nematodes with either one of these mutations will live twice as long as the wild-type, and those with both mutations have double the longevity of the single mutations. To investigate the gerontogene effects on toxicity, nematodes were subjected to varying concentrations of toxicants (hydrogen peroxide, nickel chloride) that utilized different mechanisms of toxicity. Survival was observed for 1-2 weeks, depending on the toxicant. Results seemed to indicate that these mutations tended to make the nematodes slightly less susceptible to hydrogen peroxide, but quite a bit more sensitive to nickel. Therefore, while these gene mutations may possibly seem desirable to researchers who seek a "Fountain of Youth" for humans, the nickel tests should give pause if those striving for greater longevity don't wish to live in a closed environment.

COMPARATIVE ACUTE TOXICITY OF HEAVY METALS TO DRAGONFLY LARVAE. Valerie Tollett and Timothy Rice, Dept. of Biology, Univ. of S. Ala., Mobile, AL 36688.

Dragonflies (Insecta: Odonata) occupy an important position in aquatic ecosystems, serving as both predator and prey throughout their life cycle. These natural history features create the potential for long term exposure to toxicants from a variety of sources. Despite their importance in aquatic ecosystems, there is little field or laboratory data regarding the impact that environmental chemicals have on odonates. To determine the impact of heavy metals on dragonfly larvae, acute toxicity tests were conducted in the laboratory. Larvae measuring 5-10mm were collected from the field and held in a circulating, filtering system for one week. The species, *Pachydiplax longipennis*, was chosen for this study due to their abundance and wide distribution. Seven day acute toxicity tests were conducted to compare the effects of equimolar concentrations (0, 0.04, 0.35, 0.89, 2.2mM) of lead, copper and cadmium. Using immobility as the endpoint, the larvae exhibited a high tolerance to cadmium and lead, but high levels of mortality to copper. This species of odonate appears to be extremely resistant to metals compared in general to other common aquatic test species (e.g. *Daphnia*, *Chironomus*, *Rana*, *Xenopus*). High resistance to metal pollution could make odonate larvae a potential indicator of poor water quality in contaminated habitats. Their ability to withstand and potentially accumulate high levels of metals might also put their predators at risk from ingestion of contaminated larvae or adults.

LEAD ASSESSMENT WITHIN THE SOIL, WATER, AND VEGETATION IN SHOOTING RANGES AT THE GRAND BAY NERR. Katherine E. VanDeven and Timothy Rice, Dept. of Biology, University of South Alabama, Mobile, AL 36688.

The Grand Bay National Estuary Research Reserve was established in 1999 by NOAA and is maintained by the Mississippi Department of Marine Resources. The reserve is located in Jackson County, Mississippi between Pascagoula and the Alabama state line. The abandoned Live Oak Rifle and Pistol Range lie within the boundaries of the NERR and is the main study site. The Live Oak Rifle and Pistol Range ecosystem consists of forested areas, wetlands that are seasonal, and a permanent pond. This project addresses the amount of lead present in the Live Oak Rifle and Pistol Range. Four collection sites were chosen throughout the range, and included: a short-range target, a long-range target, a pond behind the range, and the shooting area. The ditch water along the road was also sampled to determine the difference between contaminated road water and the range water. The lead levels for the soil samples ranged from 19.57 µg/g to 137,835.9 µg/g. Lead levels for the vegetation samples ranged from 2.66 µg/g to 2290.37 µg/g. Lead levels in water samples ranged from 0.45 µg/L to 557.4 µg/L; some of these samples were above EPA acceptable limits. These values were comparable to levels reported from other shooting ranges. These initial results indicate possible lead contamination within this estuary reserve.

ACUTE TOXICITY OF FIPRONIL AND ITS ENANTIOMERS TO MARINE AND FRESHWATER NON-TARGETS. Jay Overmyer, Univ. of GA, Dept. of Ent., Athens, GA 30602. A.W. Garrison, USEPA, NERL, Athens, GA 30605. J. Avants, USEPA, NERL, Athens, GA 30605. M. DeLorenzo, NOAA/NOS, Charleston, SC 29412. P. Key, NOAA/NOS, Charleston, SC 29412. K. Chung, NOAA/NOS, Charleston, SC 29412. B. Konwick, Univ. of GA, Dept. of Env. Health Sci., Athens, GA 30602. W. A. Wilson, Univ. of GA, Dept. of Env. Health Sci., Athens, GA 30602. M. Black, Univ. of GA, Dept. of Env. Health Sci., Athens, GA 30602

Fipronil is a phenylpyrazole insecticide used in agriculture and domestic settings for controlling various insect pests in crops, lawns and residential structures. Fipronil is chiral; however, it is released into the environment as a racemic mixture of two enantiomers. In this study, the acute toxicity of the (+) and (-) enantiomers and the racemic mixture of fipronil were assessed using *Ceriodaphnia dubia* (water flea), *Simulium vittatum* IS-7 (black fly), *Xenopus laevis* (African clawed frog), *Palaemonetes pugio* (grass shrimp), *Mercenaria mercenaria* (hardshell clam), and *Dunaliella tertiolecta* (phytoplankton). Results showed that *S. vittatum* IS-7 was the most sensitive freshwater species while *P. pugio* was the most sensitive marine species. *Ceriodaphnia dubia* and *S. vittatum* IS-7 were the only species that showed greater sensitivity to a specific isomer or the racemate of fipronil. Increased mortality and minimal recovery was observed in all species tested for recovery from fipronil exposure.

DISTRIBUTION OF *CRASPEDACUSTA SOWERBII* IN CENTRAL ALABAMA OVER THE LAST 3 YEARS. Kaci Rodgers and James Rayburn, Biology Dept., Jacksonville State University 700 Pelham Road North, Jacksonville, AL 36265-1602.

Craspedacusta sowerbii, which is better known as the freshwater jellyfish was first described in 1880. Researchers suggest the freshwater jellyfish may have been transported from pond to pond on the feet of waterbirds. These jellyfish have been found in lakes, farm ponds, rivers, and water-filled quarries. The freshwater jellyfish is an invasive species. It has been found in many different areas in the Southern United States. In Alabama, it has been found in a few areas around Jacksonville State University. The freshwater jellyfish has been reported to live in water with a pH ranging 6.5-8.5. This research is aimed to predict when the freshwater jellyfish might appear by analyzing data logs of when they have appeared. Different areas across Alabama, where these jellyfish have been spotted, will be evaluated to help pinpoint the areas and time of year this species shows up. The data analysis will determine the prime months when jellyfish collection might be significant.

THE DEVELOPMENTAL TOXICITY OF RESMETHRIN TO EMBRYOS OF *XENOPUS LAEVIS*. James Rayburn, Biology Department, Jacksonville State University, Jacksonville, AL 36265.

Natural pyrethrin insecticides are commonly used as mosquito-cides and are currently being used locally in Jacksonville AL. These insecticides are used during the spring when many amphibian species are breeding and larvae are developing. Because this could be sensitive time for frog species, frogs could be affected by these types of chemicals. Resmethrin was chosen as a representative pyrethrin. Pyrethroid insecticides are known to be neurotoxic to mammals. The developmental effects of pyrethrin on aquatic species (in particular amphibian species) is unclear. The Frog Embryo Teratogenesis Assay *Xenopus* (FETAX) was used to determine the toxicity of pyrethrin in accordance with the ASTM (1991) procedures. This procedure exposed early blastula embryos to a free living tadpole to the pyrethrin. Mortality, Malformation and embryo length were collected. Data was analyzed using Toxtools. Both pure Resmethrin and a water soluble fraction of a commercial resmethrin were tested. Results indicated that resmethrin does not cause significant mortalities at concentrations >50 ppm. Malformations were observed. Forty-eight hour old *Xenopus* embryos exhibited a higher startle response than controls, even at concentrations as low as 1 ppm. This study suggested behavioral studies on responses on embryos exposed to resmethrin should be performed.

EFFECTS OF NANOPARTICLES ON GILL FUNCTION. Roxana Weil, Kelly Hyndman, Nancy Denslow and David Barber, UF

Nanomaterials have very high surface areas and high percentages of their component atoms on the surface, which leads them to have unusual characteristics. Because of these characteristics, nanomaterials have many uses including sporting goods, cosmetics, paints, electronics, composites, and propellants. Due to their widespread applications, nanomaterials will inevitably be released into the aquatic environment, where they will interact with aquatic organisms. The unique physical and chemical properties of nanomaterials may also lead to unique biological properties. Unfortunately, toxicity testing of nanomaterials has been extremely limited, and factors that influence the biological properties of nanomaterials are poorly understood. The goal of this study was to determine if aluminum nanoparticles adversely affect fish and if the effects are different than soluble aluminum. Zebrafish (*Danio rerio*) were exposed to 0, 0.5, 2.5 and 12.5 mg aluminum/L as aluminum chloride or 51nm spherical aluminum nanoparticles for up to 96 hours. Particles were characterized before and after exposure to determine changes in aggregation and dissolution. No mortality was induced by aluminum nanoparticle exposure, however, exposure to aluminum nanoparticles produced dose dependent reduction of gill Na/K-ATPase activity, indicating that gill function was compromised. To determine if observed effects were due to direct actions on the gill, primary cultures of gill filaments were exposed to soluble or nano-sized aluminum (0-12.5mg/L). Finally, to determine if uptake of intact particles occurs at the gill surface, zebrafish and gill filaments were exposed to insoluble CdSe/ZnS quantum dots for up to 48 hours and examined by fluorescence microscopy. This research was supported by a grant from the National Science Foundation (BES-0540920).

REPRODUCTIVE SUCCESS OF PIMEPHALES PROMELAS EXPOSED TO p,p'-DDE. David S. Barber, Center for Environmental and Human Toxicology and Elizabeth J. Ray, School of Natural Resources and Environment, University of Florida, Gainesville, FL 32608.

p, p'-DDE is the most persistent metabolite of the widely-used pesticide, DDT. Laboratory studies have shown DDE and other endocrine disrupting compounds (EDCs) alter hormone levels and gene expression patterns in the fathead minnow (*Pimephales promelas*), but have not linked those findings to population-level effects. The goal of this study was to examine the relationship between DDE body burden, expression of standard biomarkers, and reproductive output. The number of eggs laid, percent of eggs fertilized, and percent of eggs hatched as well as survival of offspring were measured in fathead minnows exposed to DDE. A control group (vehicle only) and three treatment groups (1.63 ppm, 11.48 ppm, and 104.25 ppm DDE in fish feed), each containing eight females and four males, was measured for 28 days. Survival rates and growth of offspring laid between 21-28d of the experiment were monitored until the onset of first reproduction. The number of eggs laid in the highest treatment group was reduced by 74% as compared to the control group. Average DDE body burden of fish in the highest treatment group was 110.57 ppm. This experiment suggests DDE exposure does not affect fertilization, hatchability, or fry survival rates, but can reduce the total number of eggs produced by females as well as growth and time to first reproduction of fish exposed in ovo.

THE CONCENTRATION OF THREE METALS IN TISSUES OF SELECT MARINE SPECIES FROM MOBILE BAY Bernice Moser and James R. Rayburn. Dept. of Biology, Jacksonville State University, Jacksonville AL 36265.

Mobile Bay, and estuary in the Gulf of Mexico, has more than 400-point source dischargers of pollutants and eight ancillary water bodies that have been labeled as impaired due to the high levels of toxic chemicals such as pesticides, priority organics, and metals by the Alabama Department of Environmental Management (Peachey, 2003). The ecosystem is important to the fishing industry in Mobile and many of these species are susceptible to metal contamination either by their association with the sediments or by bioaccumulation. To determine an estimate of metal contamination in Mobile Bay selected fish species were bottom collected using the research vessel Verril from Dauphin Island Sea Lab between channel markers 17 and 19. Sample collection began in February of 2005, and fish collected included: gulf menhaden (*Brevortia patronus*), hardhead catfish (*Arius felis*), hogchoker (*Trinectes maculates*), spot (*Leiostomus xanthurus*), and the least puffer (*Sphoeroides parvus*). The fish were dissected, liver and muscle tissue removed for metal analysis and frozen until processed. Samples were weighed and using trace-metal grade nitric and hydrochloric acid, digested for graphite furnace atomic absorption spectrometry. The metals examined included lead, copper, and zinc. The data was analyzed using ANOVA to compare between species.

BIOGRAPHY
of
MICHAEL WOODS

Dr. Michael Woods is Professor of Botany in the Department of Biological and Environmental Sciences at Troy University. Dr. Woods received his Ph.D. at Southern Illinois University where he worked under the direction of the renowned plant taxonomist, Dr. Robert H. Mohlenbrock.

Dr. Woods maintains an active research program and has had 10 graduate students and numerous undergraduate students conduct research under his direction. Since 1998, he has published 13 peer reviewed manuscripts on the flora of Alabama and taxonomic treatments of various genera (three of these manuscripts are published in JAAS). Additionally, 19 presentations from his lab have been made at scientific meetings during this same eight year period. His research deals primarily with legume taxonomy and floristic studies. He has completed worldwide treatments of the genera *Apios* and *Cochlianthus*. Most recently, he completed a taxonomic and distributional study of *Desmodium* in Alabama. His current research is a study of *Lespedeza* in Alabama. To support his research and those projects of his students, he has been the primary investigator or co-investigator for 28 grants and contracts in excess of \$266,000. He serves as Curator of the Troy University Herbarium (TROY). Since it was reestablished in 1997, the herbarium collection has grown to over 21,000 specimens, with a recent growth rate of 3,000 specimens per year. This makes the Troy Herbarium the fastest growing herbarium in Alabama.

Dr. Woods has provided service in several areas of his professional field. In 2005, he co-chaired the Program Committee for the annual meeting of the Association of Southeastern Biologists. He was a member of the Interim Executive Board which established The Society of Herbarium Curators (SHC). In addition, he served as the first President (2004-April 2006) for the SHC and is currently a member of the Executive Board. He is a member of the steering committee for the Southeast Regional Network of Expertise and Collections (SERNEC), a multi-year project funded by the National Science Foundation Research Coordination Network that will link herbaria databases throughout the southeastern U.S. He is a member of the Deep South eFlora, a project funded by an NSF Biological Research grant to digitally image 20,000 specimens in the Troy Herbarium over the next two years. He serves on the Executive Council of the Flora of Alabama Committee, which is in the final stages of developing a checklist of the vascular plants of Alabama. Dr. Woods is a reviewer for several journals, and, a member of several scientific societies, including The Alabama Academy of Science, The Association of Southeastern Biologists, The Southern Appalachian Botanical Society, and The Society of Herbarium Curators.

Biography



Dr. Woods' teaching has been recognized by various University organizations and he has been listed on several occasions for Who's Who Among American University Professors. In 1992 and 1994, he was a finalist for Troy University's highest teaching award, the Ingalls Award. He was the recipient of the Ingalls Award in 1999. In 2000, he was a candidate for The Carnegie Foundation's U.S. Professor-Of-The-Year. Dr. Woods teaches the undergraduate courses Organismal Biology and Plant Form and Function and the graduate courses Field Botany and Invasive Species.

The Alabama Academy of Science wishes Dr. Woods continuous success in all his future endeavors.

GORGAS SCHOLARSHIP AWARDS

March 17th, 2006

FOR IMMEDIATE RELEASE

Today the Gorgas Scholarship Committee announced the rankings of the finalists of the 2006 Alabama Science Scholar Search. The Search was held at the meeting of the Alabama Academy of Science at Troy University, Troy, Alabama.

The winner of the first-place tuition grant of \$4000 was:

(F) Jennifer Ann Taylor, 2170 Estaline Drive, Florence, AL, 35630, Florence High School, 1201 Bradshaw Dr, Florence AL 35630, Teacher-Sponsor Linda Kanipe
“Investigation of Prescription Antibiotics and Multi-drug Resistant Pathogens in the Tennessee River”

First alternate and winner of a tuition grant of \$3000 was:

Warren Matthew Chan, 3025 Lake Hampton Drive, Hampton Cove, Alabama, 35763, Randolph School, 1005 Drake Avenue, Huntsville, Alabama, 35763, Teacher-Sponsor Peggy Walker

Second alternate and winner of a tuition grant of \$2000 was:

Mingwei Gu, 1208 Rumson Drive, Hoover, Alabama, 35226-2036, Hoover High School, 1000 Buccaneer Drive Hoover, Alabama, 35244, Teacher-Sponsor Melody Greene

Third alternate and winner of a tuition grant of \$1500 was:

Diana Patterson, 114 Silverleaf Drive, Trussville, Alabama, 35173, Jefferson County International Baccalaureate School, 6100 Old Leeds Road, Birmingham, Alabama, 35210, Teacher-Sponsor Catherine Shields

Fourth alternate and winner of a tuition grant of \$1000 was:

Lacy Casteel, 234 Cedar Lane, Killen, AL, Brooks High School, 4300 Hwy 72, Killen AL 35645, Teacher-Sponsors Vicki Farina and Wanda Phillips

(F) National Intel Finalist
Unranked Finalists:

Gorgas Awards

Michael Brown, 949 Berrywood Drive, Gardendale, Alabama, 35071, Jefferson County International Baccalaureate School, 6100 Old Leeds Road, Birmingham, Alabama, 35210, Teacher-Sponsor Catherine Shields

Kimberly Paige Farris, 840 Glennwood Road, Morris, Alabama, 35116, Jefferson County International Baccalaureate School, 6100 Old Leeds Road, Birmingham, Alabama, 35210, Teacher-Sponsor Catherine Shields

Jordon Higgins, 1408 14th Street, Pleasant Grove, AL, 35127, Jefferson County International Baccalaureate, Teacher-Sponsor Debbie Anderson

Matthew L. Morton, 6425 Ransom Road, Birmingham, Alabama, 35210, Jefferson County International Baccalaureate School, 6100 Old Leeds Road, Birmingham, Alabama, 35210, Teacher-Sponsor Catherine Shields

Gregory Michael Poole, 16224 Southbrook Loop, Brookwood, Alabama, 35444, Brookwood High School, 15981 Highway 216, Brookwood, Alabama, 35444, Teacher-Sponsor Elaine Noland

Michael Pierre Plan II, 960 Berry Drive, Gardendale, Alabama, 35071, Jefferson County International Baccalaureate School, 6100 Old Leeds Road, Birmingham, Alabama, 35210, Teacher-Sponsor Catherine Shields

J. Andrew Sherrill, 12 Beech Hills Drive, Alabama, 35404-4986, Hillcrest High School, 300 Patriot Parkway, Tuscaloosa, Alabama, 35405-8606, Teacher-Sponsor Julie Covin

The rankings were established by a panel of judges consisting of department heads, deans and professors from many of the leading universities and industries in Alabama. Winners and finalists in the Gorgas Contest receive offers of tuition scholarships to colleges and universities in Alabama for the study of science. The Gorgas Scholarship Program is named for General William Crawford Gorgas, the Alabama physician who conquered yellow fever in the Panama Canal Zone and later became the Surgeon General of the United States Army. The purposes of the Gorgas competition are to promote interest in science and to aid in the education of promising students.

Information on the annual competition and awards may be found on the website at www.GorgasScholar.org. For further information, contact Dr. Ellen Buckner, Chairman, Gorgas Scholarship Competition, bucknere@uab.edu, or (205) 934-6799.

March 17, 2006
AAS Business meeting
Minutes by James Rayburn, Secretary.

Call to order 6:00 pm by Larry Davenport

Attendance

Safaa Al-Hamdani, Henry Barwood, B.J. Bateman, Brian Burnes, George Cline, Larry Davenport, Roland Dute, Omasta Gene, Richard Hudiburg, Ron Jenkins, Akshaya Kumar, Mike Moeller, James Rayburn, Roger Sauterer, P.C. Sharma, Catherine Sheilds, Steve Watts

1. First order of Business to elect new officers from ballets from George Cline

Ballets handed out

They have agreed to serve

Board of Trustee, those who are rotating off.

B.J. Bateman

Dan Holliman

Joseph Thomas

Ellen Buckner

B.J. Bateman added to be re-elected to board.

We had a lively discussion of election candidates.

We voted and votes were removed to be counted. George Cline and Akshaya Kumar went to count votes.

2. Books for Bagdad, informed to members by Dr. Al-Hamdani

Can we involve AAS? Can you send to Safaa? Can we Advertise on AAS Web?

Put a page about in the Journal? Insert in Journal.

3. Discussion- on changing format

LRP committee - looking at changes in format (timing of events)

Moving Friday Banquet To Thursday.

Proposal : Move for one year to try a Thursday night Banquet and Friday Start Paper Competition (or move competition Thursday) - Junior could finish with a 4:00 reception awards and could be college people. Goal finish by 5:00 pm

We want members to think about and discuss by email between each other and then vote by of May 1st by executive committee.

4. Can AAS apply for FED money to High School Students Science Training?

No Child Left Behind grant may be mechanism

New President would have to look at and completed by August

5. Graduate Recruiting -

University has an ability to use this in recruitment.

Have vendors and book dealers - suggest posers and or Food

George will contact Universities for recruiting

6. Results from election

Ken Roblee 2nd VP

Ellen Buckner -- Board of Trustees

Anne Cusic -- Board of Trustees

Steve Watts -- Board of Trustees

B.J. Bateman -- Board of Trustees

7. Adjourned - 6:48 pm

March 15, 2006
AAS Executive Meeting
Minutes by James Rayburn, Secretary

Meeting call to order 7:24 pm

Attendance.

Safaa Al-Hamdani, Henry Barwood, BJ Bateman, Ellen Buckner, Brain Burnes, George Cline, Larry Davenport, Mijitaba Hamissou, Richard Hudiburg, Virginia Hughes, Larry Krannich, Akshaya Kumar, Ken Marion, Mike Moeller, Gene Omasta, James Rayburn, Ken Roblee, Sauterer Roger, PC Sharma, Kenneth R. Sundberg, Virginia Vilardi, Florence Wakoko-Stubstill,

Previous minutes: Email copy of reports from October meeting - to Safaa Al-Hamdani and James Rayburn. James, and Safaa will electronic format to editor for minutes. Submission of report to be 12 pt, tmn new roman email to Safaa.. Richard to send paper copies to Safaa

Officer Reports were then given. Written reports See Below: Below is a summary of discussions that were during the meeting that are not in the written reports below.

During President Report discussion about a patron for journal and cost to be \$500.00 per ½ page space in journal. Safaa Al-hamdani foresaw no problems. Both solicited any other ideas for journal patrons. Safaa has looked into Alabama Power with no response yet.

Related to advertising Ken Sundberg looked into advertisement for meeting - Dothan Eagle was not interested, television station and radio stations were interested in – We may have reporters at meeting.

President Elect, David Nelson was absent however was recommended that he act on the above report.

During secretary report a question was raised over how long before a member is dropped from list. It was reported that after 2 years no payment we would drop people from membership. Also membership form may need improving.

During Treasure report Gene Omasta mentioned possibility that the decrease in declining dues might be related to previously not getting reminders out to members.

During Journal editor report, New Business came up to look at indexing to major databases

April issue abstract will include photos by Dr. Sauterer who will take pictures, and publish in journal. Richard working on abstracts sent for publication
In July Sharma will submit biography for journal
Editorial board is doing a good job with the English editor for journal

Counselor to AJAS -

B.J. Bateman reported needing judges - membership is dropping, need to restructure. Richard Commented that students pulled in many directions. We had only 5 active high schools.

Advertisement is not getting to Teachers said Virginia Vilardi

Schedule is also problem for students.

Ellen Buckner suggested a Task force to meet on-line- to discuss problem

JSIB Junior Academy since 1930 needs to make changes merging activities Few High Schools do not participate because they do not think they have a chance to win.

Ken Marion suggested that we tap in to other organization in near area and pick in advance and invite.

Larry Davenport raised the question of whether we should we quit Junior Academy? This received much objection and was rejected. After Discussion the decision was to create a Task force to report in November meeting on how to address this problem.

The Task force consists of:

Ken Marion

Ellen Buckner

B.J. Bateman (convener)

Virginia Vilardi

Linda

Kathern Shields

During Section Reports it was suggested that personal contact may increase membership, and Larry Krannich informed us that sessions were held at the same time as the symposium was due to the lack of rooms. Florence Wakoko Reported that Behavior and Social sciences had 11 presentation increase 9 presentations with 3 posters

During Committee Reports

The local arrangements headed by Ken Sundberg stated report was on the way. He reported we had 97 pre-registered for this year's meeting. All sections represented - section chairs need to help load talks and help with working of PowerPoint. He recommended that next year we drop offer for zip drives and have CDs and pin drives only. He encouraged the Banquet for Friday. He mentioned the possibility of mailing power points.

In the Long-Range planning committee, Ken Marion suggested that we look at format and timing changes and a task force needs to be formed. Task force for this is Ken Marion, Ellen Buckner, George Cline, B.J. Bateman, P.C. Sharma

Place and date of meeting committee reported by Larry Krannich is in the back of meeting program we are looking for a 2010 host. Tom Bilbo is stepping down as chair need replacement - David Nelson will need to appoint one.

We need somebody to chair Resolutions committee, David Nelson should get Nominations. David should ask Floreance, Wakolko, Stubstill and possible past presidents.

Mason Scholarship, It was suggest that the deadline for applications be advanced and the scholarship recipient be invited to the banquet. Mike Moeller.

Electronic media - Richard Hudiburg – Corrections on how to change process of web site. There will be potential changes in. Richard will stay one more year and then step down. Chairs must bring up to data to use access for abstracts. We need a committee for the fall. Students might be able to broaden scope. Possible to include a data base access. Abstracts are a continuing disaster. People do not read instructions for abstract submission.

Last action: We appointed Brian Toone and Meratia Cameron to Richard's committee.

OLD BUSINESS - none

NEW BUSINESS- Dr. Hamissou if you need checks see Dr. Cline

Adjournment End 9:46

After adjournment Ellen asked about having a one day Student fee. It is too late for this year.

Reports from the March 2006
Hall of Honor
Executive Committee Meeting
Troy University
Troy AL,
By
James R. Rayburn, Secretary

Call to Order and Approval of Minutes (A).

Officer Reports (B)

1. Board of Trustees, Eugene Omasta

Trustee members remain active in the affairs of the Academy including their participation at the spring and fall Executive Committee meetings. A luncheon meeting is planned at Thursday noon in the Hall of Honor Building for the Trustees, the elected officers of the Academy, and members of the Budget and Finance Committee.

2. President, Larry Davenport

Activities since Fall 2005 Executive Committee Meeting:

- 1) met with sales representative Tom Ash about Thomson/Cole becoming a patron to support the journal of Alabama Academy of Science. Tom was very receptive to the idea, esp. because th Academy has such a broad base of disciplines and includes students.
- 2) Conferred with Ken Sundberg and the Local Arrangements Committee about issues (websites, fees, registration) of the Troy University Hosted meeting.
- 3) Worked with Past President Ron Jenkins on the lineup for the meeting's symposium, "Canaries in the Environment: Nature's Monitors of Global Change." That lineup was confirmed by February 1.
- 4) Worked with Linda Wood, Secretary to Samford's Department of Biology, on resolutions to be presented at the forthcoming meeting.

3. President Elect, David Nelson

Over the past several weeks (as many of you will know), the expired terms on appointed committees have been reassigned. Although most positions have been confirmed, a number of prospective appointees have not yet responded. Naturally, some email addresses and telephone numbers have been changed, and some people have retired. Thus, it has taken much longer to complete the re-appointments than I had originally expected. Perhaps the reappointments should be conducted in the early fall to accommodate the necessary lead time. A number of the committee members expressed concerns that their committees never met-- a few people thought that their inputs might not be wanted / needed. Naturally, some committees need to

meet more frequently than do others. Some meet for specific purposes or at certain times. Many committees meet primarily by email and / or telephone. However, it is important for all committees to meet at least once a year to address the issues of business at hand. I would encourage each chair to communicate with committee members as frequently as necessary. It is important for the academy to have a wholesome and operational committee structure. Effective communication and participation of committees assures effective representation and participation of the AAS membership. Let us all continue to do what we can to conduct the necessary affairs of the Academy in an effective, timely manner.

Thank you.

4. **Second Vice-President, George Cline**

I spent the Fall and early Spring soliciting Nominations for the Second Vice-President and for 4 slots on the Board of Trustees. I have 1 candidate for the Second Vice-President, and 7 candidates for the Board of Trustees. I attempted to get individuals from a variety of disciplines (Math, Physics, Nursing, and Biology). There is also a combination of 'old faces' and new faces. Many of the people that I talked to were very excited about being involved at this level. They were particularly interested in contributing new perspectives to the organization.

The slate of Candidates is as follows:

Name	Institution	Dept.	Position
Ken Roblee	Troy	Math	VP
Sergey Beleyi	Troy	Math	Board
Ellen Buckner	UAB	Nursing	Board
Debbie Curry	JSU	Nursing	Board
Anne Cusic	UAB	Biology	Board
Govind Menon	Troy	Physics	Board
B.K. Robertson	ASU	Biology	Board
Steve Watts	UAB	Biology	Board

5. **Secretary, James Rayburn**

Since January been I have been adding members and collecting dues. I have given list of members as requested and learning about what reports are needed in this new position.

6. **Treasurer, Mijitaba Hamissou**

Second quarter October 2005 – March 2006

Balance as of 10-28-2005

\$4,516.56

A. Income

October	
Membership	\$375.00
November	
Membership	\$372.00
Journal support/subscription	\$4,000.00
Gorgas	\$1,000.00
December	
Journal support	\$550.00
AAS Journal (pub. Income)	\$600.00
January 2006	
Membership	\$1,350.00
Mason	\$20.00
February	
Membership	\$1,145.00
Journal support	\$250.00
AAS Journal (Pub. Income)	\$100.00

Total Income this quarter

\$9,762.00

B. Expenses

October	
JASS expenses	\$540.70
Honoraria	\$1950.00
Gorgas	\$1,478.60
Total expenses October	\$3,969.30
November	
Honorarium	\$200.00
Total expenses November	\$200.00
December	
JAS	\$715.00
Honorarium	\$350.00
Total expenses December	\$1,065.00
January	
Plaques/certificates	\$307.22
Honorarium	\$1,050.00
JAS	\$2,473.95
Mason scholarship	\$600.00
Total expenses January	\$4,431.17
February	
Honorarium	\$700.00
06 Meeting program booklets	\$2,132.78
Total	\$2,832.78
Total expenses this quarter	\$12,498.25

C. Current assets (bank accounts and CDs)

Checking account current, Compass per statement	\$1,707.12
Saving account, Compass	\$1,258.60
Saving account, Colonial	\$2,072.04
cd(1) + cd(2) +cd(3) as of 10 26-2005	

\$56,051.17

Total assess All accounts

\$61,088.93

7. Journal Editor, Safaa Al-Hamdani

I have taken the responsibility for the editorial ship of Alabama Academy of Science Journal on May 2005. The following has been accomplished:

1. Guidelines for the author have been written illustrating step by step the instructions to format the manuscript before submission.
2. A guideline instruction to the reviewer has been written to illustrate the major points needed to be examined in the evaluation of the manuscript.
3. Biography section has been added to the journal to high light the accomplishments of selected, past and the present, scientists to Alabama.
4. The process of reviewing the manuscript has been carried out in a timely fashion and I expected we will start releasing each issue at the correct time as intended.
5. For the very first time, the author of each manuscript received reprints of the published article.
6. I have been trying to encourage international and national manuscript submission to the Journal.
7. A new instruction for the submission process of manuscripts has been adapted to replace the old. This instruction has been published on the back of the cover of the last two issues.
8. We have started requiring hundred dollars fee of each published article to cover the cost of publication.
9. The April issue was successfully released.
10. The October issue was successfully released
11. The January issue has been submitted to the printing company.
12. I suggest continuing to combine July and October issue to reduce the cost.
13. I suggest to explore the idea of finding alternative publishers to compare cost effectiveness.

8. Counselor to AJAS, B.J. Bateman

No Written Report

9. Science Fair Coordinator, Virginia Valardi

16 Students and 8 adults from five Regional and one State Science fair traveled to Phoenix Az. for Intel ISEF 2005. The following awards were presented to our Alabama Finalists:

Special Awards:

North American Benthological Society

For projects related to the "benthos" - organisms living at the bottom of streams, lakes, estuaries and oceans, All winners receive a one-year membership in the Society and a subscription to the "Journal of the North American Benthological Society".

Honorable Mention Award

A Watershed in Recovery?

Sarah Katharine Fisher, 16, Catholic High School, Huntsville, Alabama

Patent and Trademark Office Society

Awards in eight subject categories: Earth Science, Engineering, Physics, Chemistry, Microbiology, Medicine and Health, Computer Science, and Space Science

First Award of \$200

Brownian Motors

Kimberly Paige Farris, 17, Jefferson County international Baccalaureate School, Birmingham, Alabama

Coalition for Plasma Science (CPS)

These awards will be given to the two best projects in the broad area of plasmas. Topics include (but are not limited to) plasma-related topics in lighting, display, materials processing, space physics, terrestrial phenomena {lighting, aurora, etc.}, fusion, and basic plasma science. Criteria include overall scientific merit, understanding of problem, and approach to the topic.

Award of \$500

A Non-Intrusive Investigation of a Simulated Ball Lightning Phenomenon in My Microwave Oven

Joshua David Kalin, 18, Catholic High School, Huntsville, Alabama

Category Awards:

Environmental Sciences - Presented by Ricoh

Second Award of \$1,500

Determination of Antibiotic Presence in the Tennessee River and Inflowing Waters

Jennifer Ann Taylor, 17, Florence High School, Florence, Alabama

This year nineteen students and their accompanying adults will travel from six Regional and one State Fair to Indianapolis, Indiana on May 6-13 for the 2006 Intel/International Science and Engineering Fair. They will travel by Trailways bus and stay at the Embassy Suites Hotel Downtown.

There are now six Regional Science Fairs and one State Fair. Three of our regional fairs have new fair directors. **

****N Alabama March 13-15** University of Alabama in Huntsville, Dr. Jorge Aunon

ISEF Winners:

W Alabama March 10-11 University of West Alabama, Becky Graham
ISEF Winner: Sarah Cole

****Central March 11** UAB - Birmingham J, Michael Wyss

ISEF Winners: Kate LeCroy, Paige Poole, Rahul R, Goli, and Henry Joe

****Mobile March 17-18** University of South Alabama, James J. Connors,
ISEF Winners:

Northeast Feb. 23-24 Talladega College, Mrs. Gladys Mayers Swain
ISEF Winners: Katharine Horton, Chris Overby

Greater East March 9-10 Chattahoochee Valley Community College,
Phoenix City,
Susan Marie McCollum
ISEF Winners: Jared Willis, Matt Johnson

2006 ALABAMA STATE SCIENCE AND ENGINEERING FAIR

April 6 - 8 at The University of Alabama in Huntsville, Coordinator, John Dimmock,
ISEF Winners:

10. Science Olympiad Coordinator, Jane Nall

Alabama Science Olympiad

Although our membership is down this year we rank 11th for Nation's number of B team and 10th in C teams, we have been granted Invitations for 4 teams (2 Junior and 2 high schools) to compete at the National Science Olympiad in Indiana in May. State tournaments are just around the corner, so Alabama State Director, Jane Nail's weekend travels still include trips to Huntingdon College in Montgomery, Samford University in Birmingham and National in Indiana.

We are still in need of funding to help non-served schools to pay registration and expenses for materials to compete, providing workshops to teach coaches, and to help winning teams cover expenses to National Science Olympiad.

We also are searching for a campus to host a B Division tournament, the best way to showcase a campus!

11. Counselor to AAAS, Steve Watts

Subject: Report of the Counselor to AAAS

The annual meeting for the AAAS affiliates convened on February 16-20, 2006 in St. Louis, MO. All state Academies maintain an association with the American Association for the Advancement of Science. We are members of the Section on Agriculture, Food and Renewable Resources and the Section on General Interest in Science and Engineering. In addition, we were invited to attend a session on "Informing Science Policy at State and Local Levels". The session includes information on effective inquiry based science education, science standards and how students learn; stem cell research and the use of animals in education and research; economic development incentives and funding of R&D; genetic testing; communicable diseases; and environmental and agricultural regulatory processes as examples of science-based issues facing state and local government officials. The results of this session will be distributed in the future.

The summary of minutes from the meeting included the following:

"Dr. Gil Omenn, President elect of AAAS and Program Chair for the 2006 meeting in St. Louis, stopped by for comments. The theme for the 2006 AAAS Annual meeting in St. Louis was "Grand Challenges." Dr. Omenn discussed many different aspects of the 2006 Grand Challenges theme. He also thanked the section for its participation in the 2005 meeting. Some discussion items were - different ways of thinking, society issues, science literacy, why does public not accept scientific method and evidence and others. He indicated that present budget projections for research and development funding for the next few years are will be tough."

Additional topics at the meeting included the following:

1. Remarks on Congressional Innovation Initiatives and the President's American Competitiveness Initiative by William Bonvillian, Vice President for Government Relations, MIT Washington Office
2. Update on Evolution versus Intelligent Design/Creationist and Discussion on Way the Community Can Work Effectively to Defend the Teaching of Evolution

We welcome the opportunity for any AAS member to attend the AAAS meeting on our behalf. Information about the AAAS can be obtained at www.aaasmeeting.org.

12. Section Officers

I. Biological Sciences, Brian Burnes

In my first year as Section Chair, I have been learning the procedures required to prepare the annual meeting:

1. The e-mail contact list for the Biological Sciences section has been expanded to include this year's presenters and these presenters have been encouraged to become members.
2. The Biological Sciences section has 13 posters and 45 presentations scheduled for the 83rd Annual Meeting.

- II. **Chemistry**, Jan Gryko – No written report available
- III. **Geology & Earth Sciences**, Mark Puckett –
No written report available
- IV. **Geography, Forestry, Conservation & Planning**, Bill McAllister
No Report
- V. **Physics & Mathematics**, Ken Roblee
In the 2005 annual meeting, the section hosted a total of 11 oral presentations. The student competition winner was Ron LaGrone. During the business meeting the section members have elected Dr. Bryan Thompson of UNA as the new Section Vice-Chair. As a follow-up to previous year's reports and suggestions, the chair Kenneth Roblee continued to contact department chairs in the state of Alabama to increase participation. Furthermore, he created a list of emails of such chairs for the future. In addition, for the 2006 meeting, we have a total of 18 presentations (2 by students), with one invited lecture.
- VI. **Industry & Economics**, Marsha Griffin – No written report available
- VII. **Science Education**, Lori Cormier
Science Education remains one of the smaller sections of the Alabama Academy of Science. Fourteen papers will be presented at the 2006 meetings. Voluntary paper submission to this section is low. Half of the papers (seven) were submitted only after I personally contacted individuals that I knew were involved in science education and asked them to contribute. Additional methods to elicit papers were through e-mailing the AAS announcement to department chairs in science departments in Alabama. In the 2005 meetings, the same procedure was used for recruitment.
- The contributions to the 2006 section include a broad array of topics related to science education. Educational programs in both the natural sciences and the social sciences are included. The educational settings include higher education, GK-12, and public education in museums. Two papers focus on increasing the involvement of girls in science at the GK-12 level.
- Future plans for the section should include more effort to publicize and recruit paper submissions. Most of the papers are presented by faculty in university settings, and the section would benefit from greater representation of science educators in outside of higher education. Four papers were affiliated with public education settings: Girls Inc., the Birmingham Civil Rights Museum, Sloss Furnaces Historic Landmark, and the McWane Science Center. Greater effort should be made to advertise the AAS meetings in settings such as these. It is also noteworthy that although several papers address GK-12 education, no GK-12 educators submitted papers to the science education section this year. Advertisement of

the meetings in GK-12 venues would probably be most successful if it focused in the city where the meetings are to be held. In addition, if it is possible to coordinate the meetings with the GK-12 spring break, it might make it easier for teachers to attend.

VIII. Behavior & Social Sciences, Florence Wakoko –

No written report available

IX. Health Sciences, Virginia Hughes

I was asked by Dr. Peggy Hays to Chair the Health Sciences Section at the 83rd annual meeting. I mentored two medical technology students in a research study at Auburn University Montgomery to present a paper and contacted the Medical Technology Program at University of Alabama Birmingham to also present papers. Dr. Ellen Buckner was instrumental in helping to recruit presenters at Troy University, Auburn University, and University of Alabama. There will be twenty papers presented and two posters. There are ten presenters who have entered in the competition. Awareness of the Alabama Academy of Science was given to the Director of the Cytotechnology Program at Auburn University Montgomery (Sonya Griffin) in the hopes of adding yet another discipline to the Health Sciences Section.

X. Engineering & Computer Sciences, Marietta Cameron –

No written report available.

XI. Anthropology, Phillip Koerper - No written report available.

XII. Bioethics & History/Philosophy of Science, Jim Bradley –

No written report available.

13. Executive Officer, Larry Krannich

Since the last Executive Committee Meeting, my activities have focused on the following:

1. A mailing and e-mail list was developed of all department chairs and selected faculty and a list of departmental URL's at Alabama colleges and universities for those departments appropriate for the 12 Sections of the Academy. This list was distributed to all Section Chairs to aid them in developing e-mail contact lists for the Academy sections, solicit new members, and develop meeting programming.
2. Four-thousand bookmarks announcing the call for papers/poster titles for the 83rd annual meeting of the Academy were prepared and distributed in December with an accompanying letter to pre-identified department chairs at all of the Alabama colleges and universities.

3. A combination dues notice and call for papers/poster titles for the 83rd annual meeting of the Academy was sent in December to all individuals who had paid Academy dues in the 2003-2005 time period.
4. January and February were spent coordinating with section chairs, symposium chair, junior academy, science fair coordinator, science Olympiad coordinator, and general program chair in the development of the program and program booklet for the 83rd Annual meeting of the Academy. The program booklet for the 83rd annual meeting was constructed, sent to all section chairs to proof, posted on the web (February 23, 2006), and printed.

Committee Reports (C)

1. Local Arrangements, Ken Sundberg

No written report available.

2. Finance, Eugene Omasta

The Alabama Academy of Science continues to be in excellent financial condition with total assets of \$65,561 at year end. However, the decrease in assets of \$9,049 over last years assets at this time is a concern. The assets for the past five years as reported at the Fall Executive Committee meetings and Annual Spring meetings of the Academy are listed below:

Period	Assets (End of Period)	Change	Period	Assets (End of Period)	Change
1/1 - 10/12/ 2001	\$71,763		1/1 - 12/31/ 2001	\$75,813	
1/1 - 10/12/ 2002	\$72,197	\$434	1/1 - 12/31/2002	\$72,813	-\$ 3,000
1/1 - 10/12/ 2003	\$71,403	-\$794	1/1 - 12/31/2003	\$74,800	\$ 1,987
1/1 - 10/26/ 2004	\$74,265	\$2,862	1/1 - 12/31/2004	\$74,610*	-\$ 190
1/1 - 10/26/ 2005	\$63,895	-\$10, 370	1/1 - 12/31/2005	\$65,561*	-\$ 9,049

The decrease in assets at the end of the year is mostly a result of declining dues revenue and an increase in Journal expenses due to printing back issues of the Journal this year.

Dr. Krannich sent out post card reminders in December, 2005, to all persons who were either currently members or have been a member at some time during the past 5 years. It is to early to tell for sure, but it looks like that effort is yielding dividends. Again, I recommend the Academy continue to explore ways of increasing revenues and in particular increasing membership.

* estimated

3. Membership, Mark Meade –

No written report available.

4. **Research, Steve Watts**

This year 19 students (the same as last year) applied for travel awards to the Troy University meeting. All were presenting papers or posters. All students were from out of town and were each awarded \$35. Budgeted amount for travel is \$750 and we encumbered \$665. Taba will have their checks ready at the registration table. In addition, 5 students (down from 8 last year) applied for research grants. The committee is evaluating the grants and most of these will be awarded partially or in full (budgeted amount is \$2,400). Support for book purchases are no longer allowed this year, nor is travel to other conferences (decided at last years meeting). An additional 23 students (down from 40) have applied for the Research Paper/Poster Competition in several sections. New (slightly modified) evaluation forms and suggested criteria were sent to all section chairs and are now on the web. I believe we need to look at mechanisms to increase student participation in the competition.

All categories of awards and activities were handled electronically for the third year. Several minor modifications may be needed for next year, but in general electronic submissions greatly improved the process and eliminated a gruesome paper trail. Richard Hudiburg has done an outstanding job in fine tuning the process of submission.

5. **Long-Range Planning, Ken Marion**

No written report available.

6. **Auditing, Senior Academy, David Schedler**

No written report available.

7. **Auditing, Junior Academy, Govind Menon**

No written report available.

8. **Editorial Board & Associate Journal Editors, Thane Wibbels**

No written report available.

9. **Place and Date of meeting, Tom Bilbo**

No written report available.

10. **Public Relations, Richard Buckner**

No written report available.

11. **Archives, Troy Best**

No written report available.

12. **Science and Public Policy, Dail Mullins**

No written report available.

13. **Gardner Award, Prakash Sharma**

No written report available.

14. **Carmichael Award**, Richard Hudiburg
No written report available.
15. **Resolutions**, -- No written report available.
16. **Nominating committee**, George Cline
See B4 above for written report.
17. **Mason Scholarship**, Mike Moeller
We had three complete applications for the William H. Mason Fellowship this year. After considering the application material, the committee selected Ms. Kelly Harbin for the \$1000 fellowship. She was recently notified of her award and we are waiting her acceptance of the conditions of the Fellowship. Ms. Harbin received a B.S. with a major in biology from Samford University in 2002 and an M.S. in Environmental Management in 2003, also from Samford University. She is enrolling at the University of Alabama in Birmingham for her teacher certification program.
The committee chairperson is very appreciative of Dr. Malcolm Braid and Dr. Sandy Caudle for their work in reading and rating the applications.
18. **Gorgas Scholarship Program**, Ellen Buckner – No Written Report
The Gorgas Scholarship Competition has undergone major changes. The Intel National Science Talent Search discontinued its affiliation with the State Science Talent Search in 2005. Our Gorgas competition, which was one of only 3 active state competitions, therefore is now an independent Gorgas Scholarship Competition. The following changes were made for the 2006 Competition:
 1. The Competition was renamed the Alabama Science Scholar Search and Gorgas Scholarship Competition.
 2. A website was set up by webmaster Richard Hudiburg at www.GorgasScholar.org
 3. A direct application process was initiated.
 4. High School Science Teachers were consulted to redesign the application process. The resulting application is shorter and deadline date is in January.
 5. Application materials, announcements and the list of awards and additional scholarships offered by Alabama Colleges and Universities were developed, updated and placed on the website.
 6. Extensive publicity was done to advertise the new application procedure. This included the following:
 - a. Announcements and exhibit booth at the Alabama Science Teacher's Association (ASTA) meeting
 - b. Letters of invitation sent to prospective applicants who entered the Intel National Science Talent Search, those participating in Science

Fairs (State and ISEF) and paper reading competitions (JSHS) in 2005 and participants in the 2005 Alabama Governor's School.

- c. Announcements sent to all International Baccalaureate Schools, the Alex Science Teacher Listserv, past Gorgas teachers, and teachers who indicated an interest at the ASTA meeting.

Applications were submitted in paper copy and electronically but with an additional signature page assuring student compliance with policies and rules of the competition and a teacher endorsement of the application. A research report and transcript was required but other materials were reduced. Materials specific to individual projects included human participants approval or other documentation as appropriate.

Due to these efforts, changes in the application and availability through the website, applications increased this year to 18. This year, one of the Gorgas Finalists is a national finalist in the Intel Science Talent Search. The Committee would like to recognize the outstanding teacher-sponsors of these students. Their work in encouraging students to enter the competition is instrumental to both the success of the program and to the success of the students. These are as follows:

Brooks High School	Vicki Farina, Wanda Phillips
Brookwood High School	Elaine Noland
Florence High School	Linda Kanipe
Hillcrest High School	Julie Covin
Hoover High School	Melody Greene
Jefferson County International Baccalaureate	Catherine Shields, Debbie Anderson
LeFlore High School	V. Hall
Randolph School	Peggy Walker
Vestavia Hills High School	Erin Shonsey
Wetumpka High School	Virginia Vilardi

This fall, the Gorgas Committee welcomed Kay Worley representing the Alabama Power Foundation. Diane Tucker, Director of the new Science & Technology Honors Program at UAB joined the committee in January. Richard Hudiburg agreed to initiate and manage the website in these new procedures. Numerous scientists participated as judges in paper reading preliminary scoring and others will be judging the final competition. Thanks to all for their efforts on behalf of the Gorgas Scholarship Competition.

The APF Legacy Endowment Fund also funds expenses of the competition and has assisted with website and other expenses. Additional allocations from the APF were requested this year and were received from them.

The finals of the Gorgas Competition will be held Friday, March 17, in Room 103 of the McCall Science Center on the Troy University campus. The Committee would like to thank Ms. Teresa Moore for her excellent assistance in preparations for the Gorgas competition and recruitment of

judges from Troy University. Please attend the open viewing of Gorgas exhibits from 3:00 to 5:00 in Room 103 of the McCall Science Center. The winners will be announced at the Joint Banquet.

19. **Electronic Media**, Richard Hudiburg – No Written Report.

Alabama Academy of Science Journal

Scope of the Journal

The Alabama Academy of Science publishes significant, innovative research of interest to a wide audience of scientists in all areas. Papers should have a broad appeal, and particularly welcome will be studies that break new ground or advance our scientific understanding.

Information for the Authors

- Manuscript layout should follow the specific guidelines of the journal.
- The authors are encouraged to contact the editor (E-mail: sah@jsu.edu) prior to paper submission to obtain detailed guidelines for the author.
- At least one author must be a member of the *Alabama Academy of Science* (except for Special Papers).
- The correspondent author should provide the names and addresses of at least two potential reviewers.
- Assemble the manuscript in the following order: Title Page, Abstract Page, Text, Brief Acknowledgments (if needed), Literature Cited, Figure Legends, Tables, Figures.

What and Where to Submit

The original and two copies of the manuscript and a cover letter should be submitted to the following.

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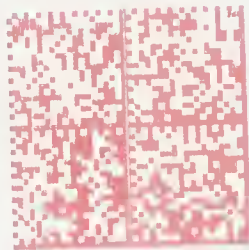
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Manuscripts will be reviewed by experts in the research area. Manuscripts receiving favorable reviews will be tentatively accepted. Copies of the reviewers' comments (and reviewer-annotated files of the manuscript, if any) will be returned to the correspondent author for any necessary revisions. The final revision and electronic copies are then submitted to the /Alabama Academy of Science Journal/ Editor. The author is required to pay \$100 for partial coverage of printing costs of the article.

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